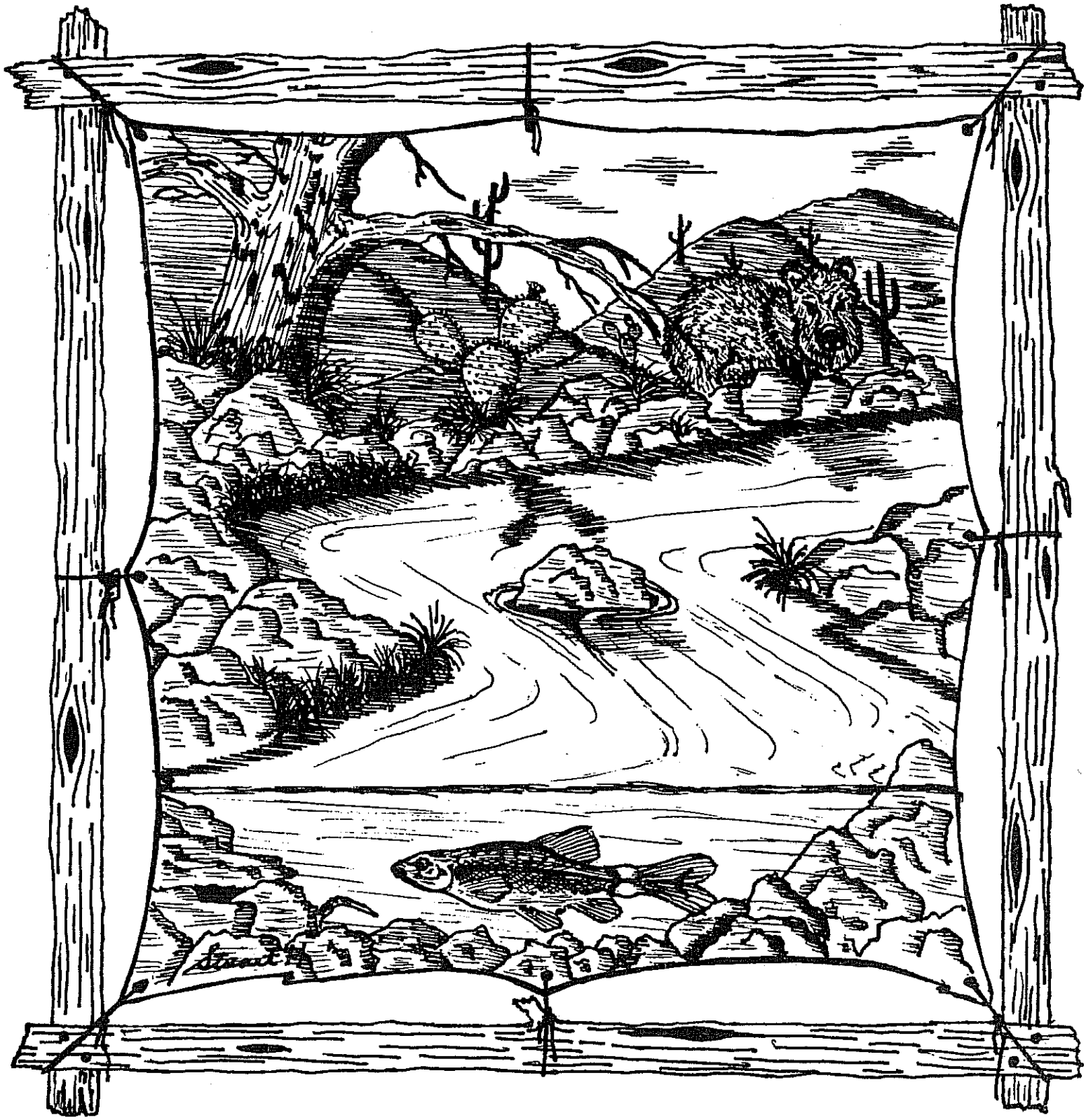
United States Department of Agriculture

Forest Service

Apache - Sitgreaves National Forests

A FISH AND RIPARIAN SURVEY OF THE CLIFTON RANGER DISTRICT



FINAL REPORT

TO

UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

APACHE-SITGREAVES NATIONAL FOREST

A FISH AND RIPARIAN SURVEY

OF THE

CLIFTON RANGER DISTRICT

Submitted by:

NONGAME BRANCH

ARIZONA GAME AND FISH DEPARTMENT

2222 WEST GREENWAY ROAD

PHOENIX, ARIZONA 85023

Diana Papoulias
David Valenciano
Dean Hendrickson

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INTRODUCTION

Stream habitats and fishes of the Clifton District are among the least surveyed of Arizona. Important populations of Threatened and Endangered fishes (Table 1) occur in this area, but their distributions and abundances are poorly known. In the Gila River basin where entirely native fish faunas are uncommon, at least one stream in the Clifton District supports a community of five native fishes with no exotic species present. Similar communities were suspected to occur in other unsurveyed streams of the area.

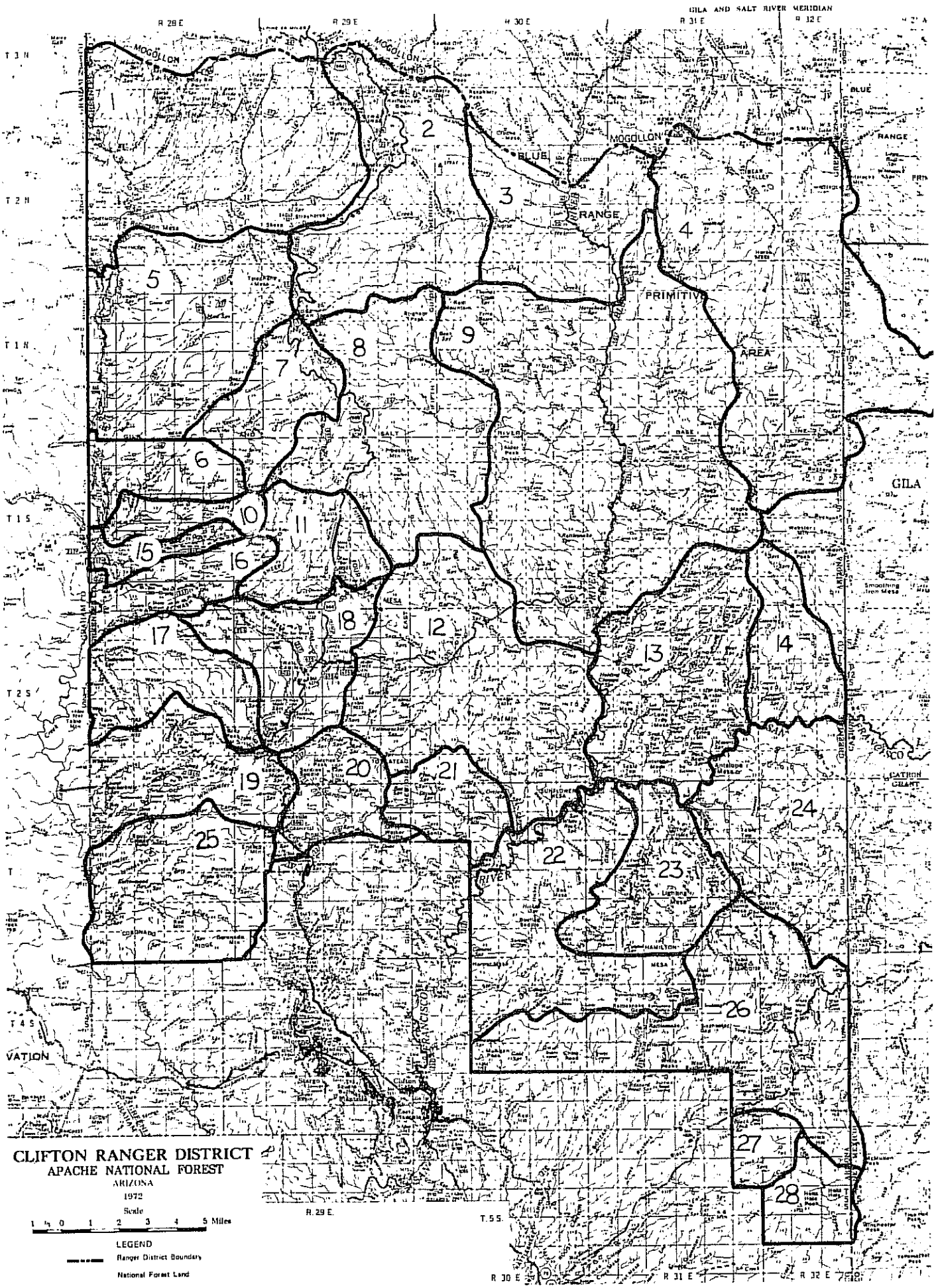
Table 1. State and federal status of fishes found or potentially occurring on the Clifton Ranger District, Apache-Sitgreaves National Forest, Arizona (Arizona Game and Fish Department 1988).

Species	State	Federal
Gila trout (*Salmo gilae*)	Endangered	Endangered
Razorback sucker (*Xyrauchen texanus*)	Endangered	
Apache trout (*Salmo apache*)	Threatened	Threatened
Colorado roundtail chub (*Gila robusta robusta*)	Threatened	
Gila chub (*Gila intermedia*)	Threatened	
Spikedace (*Meda fulgida*)	Threatened	Threatened
Loach minnow (*Tiaroga cobitis*)	Threatened	Threatened

This study was conducted to provide managers of Forest Service lands information on fish distributions and abundances. Recognizing that land use in riparian areas will impact aquatic habitats and ultimately fish populations, descriptions of associated riparian habitat are also included. Twenty-four tributaries and the mainstem rivers on 14 grazing allotments in the Blue River, Eagle Creek and San Francisco River drainages were surveyed (Fig. 1). Additionally, data from historical collections in these drainages on the Clifton District are provided. The information provided herein on aquatic systems and fish faunas of the Clifton Ranger District will assist managers with future management decisions, planning, and project evaluation.

Fig. 1. Map (next page) of Clifton Ranger District, Apache-Sitgreaves National Forest with grazing allotments indicated.

1. East Eagle
2. Strayhorse
3. Unnamed
4. Alma Mesa
5. Mud Springs
6. Base Line
7. Hogtrail
8. A D Bar
9. Sandrock
10. Horse Springs
11. Mesa
12. Pigeon
13. Wild Bunch
14. Copperas
15. Bee Springs
16. Big Dry
17. Water Canyon
18. N O Bar
19. Tule
20. Granville
21. Sardine
22. Hickey
23. Pleasant Valley
24. Harden Ciénega
25. Dark Canyon
26. Blackjack
27. Lop Ear
28. Hells Hole


GILA AND SALT RIVER MERIDIAN
R 28 E
R 29 E
R 30 E
R 31 E
R 32 E
T 3 N
T 2 N
T 1 N
T 1 S
T 2 S
T 4 S
MOGOLLON
BLUE
RANGE
PRIMITIVE
AREA
GILA
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CLIFTON RANGER DISTRICT
APACHE NATIONAL FOREST
ARIZONA
1972
Scale
1 ½ 0 1 2 3 4 5 Miles
LEGEND
Ranger District Boundary
National Forest Land
R. 29 E.
T. 5 S.

METHODS

Field work for riparian habitat descriptions and fish sampling for this study was performed during January, February and June, 1988 for a total of approximately 147 field-person days. Surveys were conducted on foot with gear carried in backpacks or on Forest Service (FS) mules. A FS helicopter also shuttled equipment to and from the Baseline Camp for the Blue River Wilderness portion of the study.

In general, tributaries were surveyed from the mouth, or point of access, to and including a stretch of perennial flow. For descriptive purposes surveyed sections of the creek were divided into reaches separated by changes in physical aspects of canyon such as width, grade, degree of terrace development, substrate composition, and permanence of flow. Permanence of flow was determined by vegetation. Two criteria were used in designating reaches as perennial. First, the presence of hydrophytic tree species such as alder and willow. Second, the presence of flowing water during summer sampling. Reaches were termed ephemeral when flow was absent and/or streamside vegetation was dominated by upland tree species such as ponderosa pine and juniper. Reaches of each stream were numbered consecutively from downstream to upstream. When time permitted, the entire creek was walked. Where a single creek occurred on multiple allotments or at more than one elevational life-zone an effort was made to sample each corresponding riparian habitat. However, winter sampling was often hampered and unavoidably abbreviated due to severe weather and high flows.

In addition to the tributaries, the principle rivers were sampled for fish. Data are also included from other studies of fishes on the Clifton District. The reader is directed to the cited literature for detailed methodologies of the latter studies.

Riparian vegetation

A permanent photo point representative of a section of creek was established in one or more perennial areas. Photo point locations are provided in Appendix A. Rebar stakes painted fluorescent orange mark each photo point. Color slides of up- and downstream views document riparian vegetation at each locality. At each photo point, a U.S. Forest Service riparian scorecard was completed (Appendix B). In addition, a narrative description of riparian vegetation along with an assessment of grazing impact is provided for each reach of creek surveyed. An estimate of diameter at breast height (DBH) is given for an average tree within a stand in order to provide age-class information.

Fish sampling

Fish were sampled at most photo point locations for information on species composition, length, weight, and catch-per-unit-effort (CPUE).

At other locations spot sampling provided data on distribution of species. Fish were sampled primarily with a Coffelt 12-V backpack (Model BP4) electrofishing unit and two netters. In those streams which were very small and shallow, an area of stream was kicked into a dipnet. Amperage and voltage varied depending on habitat, but were generally 200 and 0.5, respectively. All habitat types (pools, runs, riffles and backwaters) were sampled. Each sample consisted of various numbers of discrete collecting efforts. Each effort was approximately 100 seconds (actual time electricity was applied to the water) duration, or a single kick sample, applied to relatively homogeneous habitat types. Identification, and weight and length measures were done in the field. An OHAUS Port-o-gram® balance recorded weight (WT) to the nearest gram (gr) and standard or total length (SL and TL, respectively) was measured to nearest millimeter (mm). All CPUE data presented here, are expressed as catch (in numbers) per 100 seconds actual shocking time. All population estimates were obtained from depletion samples over a fixed habitat area, and were calculated using formulae of Everhart and Youngs (1981).

Most fish were released. Voucher specimens were preserved in 10% formalin in the field and later deposited in the fish collection at Arizona State University.

RESULTS

ORGANIZATION

Results of individual creek surveys are grouped according to drainage (Blue River, Eagle Creek, San Francisco River) and grazing allotment on which the section of creek is located. A corresponding Runwild code (Silvey et al. 1984), the legal location and the elevation of the section surveyed is given for each stream.

BLUE RIVER DRAINAGE

A D Bar Allotment

Squaw Creek [611.073041, Rose Peak Quad, T1N,R29-30E. Elevation (ft): 5600 - 6000]

Squaw Creek was surveyed from where FS trail 14 meets the Creek downstream 6.8 km (Fig. 2). This stretch was divided into 5 distinct reaches beginning downstream and continuing up to FS trail 14. Only the last 5.6 km, or reaches 3 - 5 are on the A D Bar allotment and discussed here; reaches 1 and 2 are on the Sandrock allotment.

Riparian--The canyon in reach 3 opened up, gradient was moderate, terraces were well developed, cobbles and small boulders dominated substrate and flow was equally represented by perennial and ephemeral stretches.

Ephemeral stretches were dominated by scattered mature boxelder (Acer negundo) or juniper (Juniperus sp.; 10.0 - 15.0 cm DBH). Reproduction was indicated by a few scattered seedlings. Severe bank cutting had exposed tree roots.

Terraces were dominated by narrowleaf cottonwood (Populus angustifolia; 25.0 - 50.0 cm DBH) with tree understory consisting of walnut (Juglans major; 10.0 - 20.0 cm DBH). Scattered large narrowleaf cottonwood (> 75.0 cm DBH) and discontinuous seedling clumps were in some ephemeral stretches. Shrub midstory was dominated by birchleaf buckthorn (Rhamnus betulaefolia), pinyon pine (Pinus sp.) and walnut seedlings.

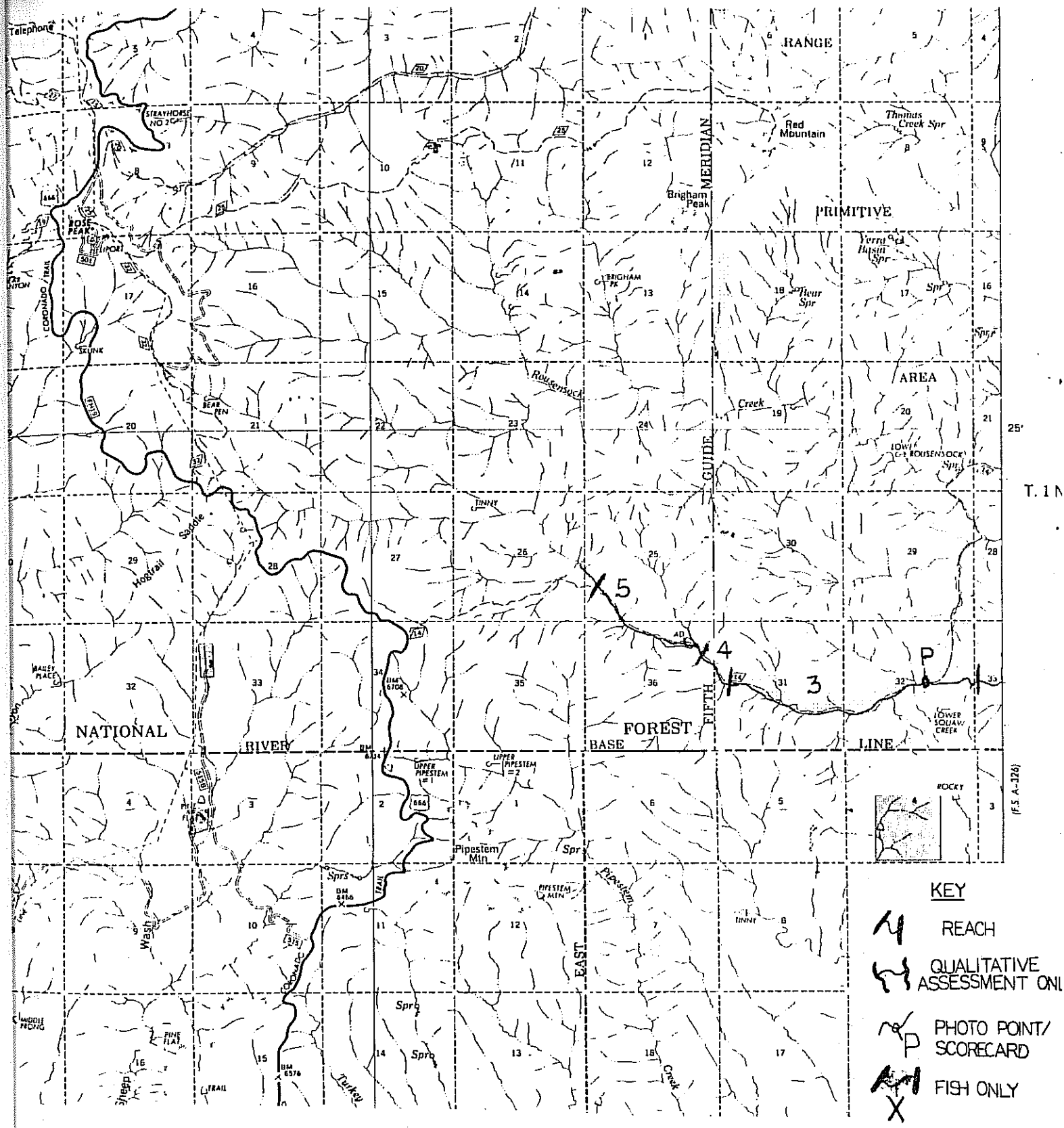
Perennial stretches of reach 3 were characterized by a tree overstory dominated by scattered, mature narrowleaf cottonwood individuals (> 80.0 cm DBH). Reproduction was more continuous consisting of dense clumps of saplings and seedlings.

Terrace vegetation communities of reach 3 were similar in ephemeral sections of the stream. Isolated, mature narrowleaf cottonwood (> 75.0 cm DBH) were found on selected terraces.

Canyon narrowed sufficiently in reach 4 to exclude terrace development. Substrate was dominated by bedrock and large boulders and flow was mostly perennial.

Riparian vegetation was limited to an occasional mature boxelder or walnut (10.0 - 20.0 cm DBH). Abundance of bedrock eliminated good habitat for seedlings.

In reach 5 canyon opened up, gradient lessened, substrate was dominated by boulders, and flow was ephemeral.



2. Map of Squaw Creek and reaches 3, 4, and 5 on the A D Bar allotment.

Vegetation at channel margin consisted of isolated, mature walnut or boxelder (10.0 - 20.0 cm DBH). Reproduction was almost non-existent. Severe downcutting resulted in terrace at 1.0 - 1.5 m above channel floor. Exposed tree roots were common and cut banks appeared unstable. Terrace vegetation consisted of tree overstory dominated by ponderosa pine (Pinus ponderosa). This and other upland species were noted to have invaded to terrace lip. Tree understory was dominated by walnut or Gambel's oak (Quercus gambelii; 10.0 - 20.0 cm DBH). Junipers were also present in shrub midstory. A depauperate shrub understory consisted of birchleaf buckthorn (Rhamnus betulaefolia) monocultures.

Cattle damage was evident in reaches 3 and 5 . In ephemeral stretches, terraces were covered with large bare areas and heavy trailing. Shrub reproduction was limited with many shrubs broken or showing signs of grazing. Grasses were almost non-existent. The few that were present lacked seedheads. Perennial areas were equally impacted as indicated by narrowleaf cottonwood seedlings grazed to the stem base. Restricted access in reach 4 probably explains lack of grazing damage in this area.

Fish--In 25 sampling trials using a dip net, no fish were taken. The minimal flow made sampling difficult. Aquatic habitat data not recorded.

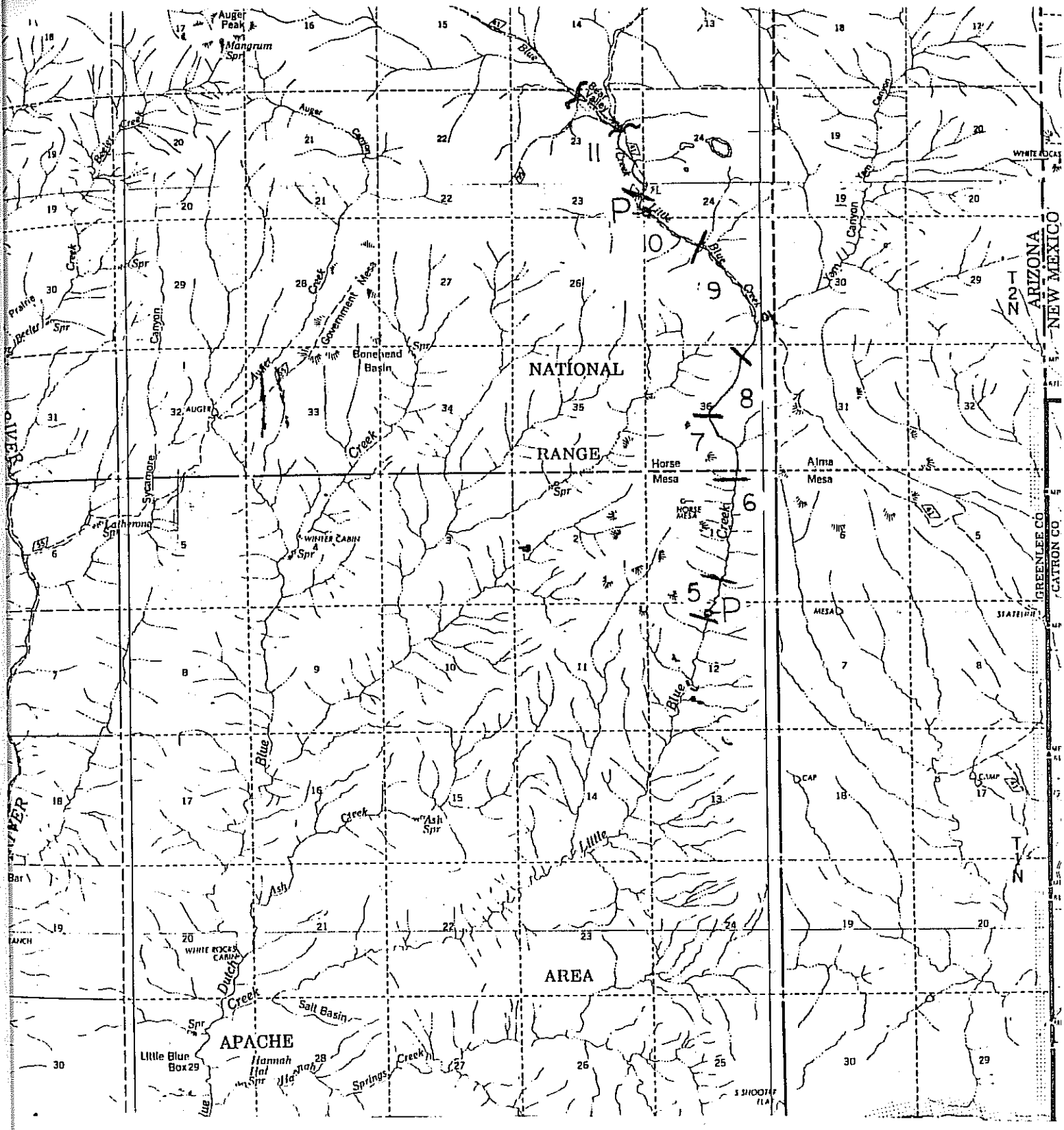
Alma Mesa Allotment

Little Blue Creek [611.07303, Alma Mesa Quad, T1-2N,R31E. Elevation (ft): 5640 - 6740]

The 18-19th of June Little Blue Creek survey on the Alma Mesa allotment, covered 7.4 km (Fig. 3). This section extended 7.0 km downstream from the confluence with Yam Canyon and 0.4 km upstream to beyond the spring at Bear Valley. The entire section surveyed was divided into 7 reaches, numbered 5 - 11 (see Sandrock allotment for reaches 1 - 4).

Riparian--Reach 5 began 7.0 km downstream of the confluence of Little Blue and Yam Canyon. It was characterized by well developed terraces, substrate consisting of a variety of particle sizes, shallow gradient and perennial flow.

Tree overstory along stream was dominated by continuous stands of medium-size alder (Alnus oblongifolia; 10.0 - 20.0 cm DBH) with isolated larger individuals (25.0 - 35.0 cm DBH). Sycamore (Platanus wrightii; > 50.0 cm DBH) was co-dominant. There was evidence of reproduction for all species, but particularly alder and narrowleaf cottonwood.



3. Map of Little Blue Creek, reaches 5 - 11 on the Alma Mesa allotment.

Terraces were dominated by sycamore (> 50.0 cm DBH) in upper story with narrowleaf cottonwood co-dominant. Understory tree level was identified by Arizona oak (Quercus arizonica; 20.0 - 35.0 cm DBH). Alligator juniper (Juniperus deppeana; > 60 cm DBH) was the co-dominant. Shrub midstory consisted principally of birchleaf buckthorn, with young juniper and silk tassel (Garrya wrightii) co-dominant. Surface water was intermittent in this stretch. One dry reach extended 0.8 km.

In reach 6, the channel meandered through a canyon with conglomerate walls. This reach was characterized by a shallow gradient, substrate dominated by large boulders and bedrock, well developed terraces, and essentially ephemeral flow.

Streamside vegetation was dominated by sycamore (35.0 - 55.0 cm DBH) with narrowleaf cottonwood co-dominant. Reproduction by these species was sparse and limited to an occasional sycamore seedling or small clumps of narrowleaf cottonwood saplings. Boxelder seedlings were occasional and widely scattered, whereas dense clumps of alder seedlings and saplings where common. Small, isolated perennial sections occurring within this reach contained alder saplings, scattered larger alder (3.0 - 8.0 cm DBH) and small clumps of narrowleaf cottonwood saplings and seedlings.

Dominant overstory tree on terrace was sycamore (40.0 - 50.0 cm DBH). Very large alligator juniper (> 80.0 cm DBH) or narrowleaf cottonwood (40.0 - 60.0 cm DBH) were co-dominant. Douglas-fir (Pseudotsuga menziesii) and ponderosa pine existed only as occasional, widely scattered individuals. With increasing elevation narrowleaf cottonwood lost importance to ponderosa pine as co-dominant. Gambel's oak and Arizona oak (10.0 - 20.0 cm DBH) together with small pinyons were in the understory. Terraces had an adequate shrub midstory largely dominated by buckthorn with juniper saplings and silk tassel. Numerous narrowleaf cottonwood seedlings and saplings were present in shrub layer. Walnut (10.0 - 20.0 cm DBH) also occupied the understory and/or midstory as scattered individuals or groupings of mature trees. Canyon grape (Vitis arizonica) and poison ivy (Rhus radicans) existed in widely separated clumps.

The canyon opened up in reach 7, gradient decreased, terraces widened, and flow remained perennial. Channel substrate contained a variety of particle sizes dominated by small boulders with occasional large talus blocks.

Channel vegetation consisted of mature alder (10.0 - 20.0 cm DBH) with fairly continuous, often dense clumps of smaller trees (< 10.0 cm DBH). Reproduction was evident as dense discontinuous clusters of saplings. Co-dominants in channel included narrowleaf cottonwood (55.0 - 80.0 cm DBH) or boxelder (10.0 - 20.0 cm DBH). Reproduction was evident for boxelder as seedlings and cottonwood as young saplings.

Overstory on terraces was dominated by ponderosa pine (25.0 - 35.0 cm DBH) with sycamore (55.0 - 80.0 cm DBH), alligator juniper (75.0 - 90.0 cm DBH) or cottonwood (60.0 - 80.0 cm DBH) as co-dominant. Gambel's oak or walnut (both 10.0 - 20.0 cm) dominated tree understory. Shrub midstory was represented by birchleaf buckthorn, young Gambel's oak and young walnut. Ground was densely covered with poison ivy and canyon grape.

In the upper section of this reach mature Douglas-fir (25.0 - 35.0 cm DBH) were dominant on terraces.

Reach 8 was steep, the channel substrate was dominated by large boulders and talus blocks, terrace development was narrow, and flow was perennial.

Channel vegetation was dominated by alders with mature individuals (30.0 - 60.0 cm DBH) widely scattered and clumps of young trees and saplings dense, sometimes continuous.

Upper canopy of terrace was predominantly Douglas-fir or white fir (Abies concolor; 25.0 - 90.0 cm DBH) and Gambel's oak and boxelder (10.0 - 20.0 cm DBH) in the understory. Tree under-story dominated by young Douglas-fir and white fir. Shrub midstory consisted of buckthorn, young Douglas-fir, and white fir. Birchleaf buckthorn and New Mexican locust (Robinia neomexicana) occurred in disturbed areas, i.e., where talus slopes spilled onto terraces. A dense ground cover consisted of forbs, geraniums, poison ivy and Gambel's oak seedlings.

Reach 9 began at the first gate downstream from the confluence with Yam Canyon. It was characterized by a wide canyon, shallow gradient, an entrenched and braided channel composed of various particle sizes and ephemeral flow. Serious downcutting occurred here with many ponderosa pine having fallen into channel from terrace. Large boulders and logs clogged channel. Channel vegetation consisted of widely scattered, mature individuals of boxelder (8.0 - 15.0 cm DBH) and/or walnut (10.0 - 15.0 cm DBH). Reproduction was present but subdued. Upland species (juniper and ponderosa pine) were distributed along high water boundary. Entrenchment was commonly encountered where terraces were 2.0 - 3.0 m above channel. These banks were very unstable, displaying exposed roots and fallen trees.

Terraces were vegetated with mature ponderosa pine (20.0 - 60.0 cm DBH) and widely scattered Douglas-fir (40.0 - 50.0 cm DBH). Reproduction was evident for both species, particularly ponderosa pine. Tree understory was dominated by Gambel's oak (10.0 - 25.0 cm DBH) with Rocky Mountain juniper (Juniperus scopulorum; 16.0 - 20.0 cm DBH) as co-dominant. Shrub midstory was dominated by juniper and walnut saplings with some scattered buckthorn.

In reach 10 the canyon narrowed, gradient steepened, substrate was dominated by bedrock and large particles, and flow was perennial.

Channel was firmly entrenched 1.0 - 2.0 m below terrace. Alder, often dense, dominated channel vegetation. Large, mature individuals (20.0 - 30.0 cm DBH) were common. Continuous, linear stands of seedlings and saplings suggests healthy reproduction in this area. Arroyo willow (Salix lasiolepis) was localized, but common. Rosa sp. was present in the shrub midstory along channel interspersed with scattered mature boxelder (10.0 - 20.0 cm DBH). Boxelder reproduction, in the form of seedlings, was fairly extensive.

Terraces were dominated by mature Douglas-fir (30.0 - 80.0 cm DBH) with ponderosa pine as co-dominant southwestern white pine (Pinus strobiformis) replaced ponderosa in moister terrace locations. All size classes were noted. Tree understory was dominated by Gambel's oak (10.0 - 20.0 cm DBH), walnut (10.0 - 30.0 cm DBH) and in the upper end of reach, big-tooth maple (Acer grandidentatum; 15.0 - 25.0 cm DBH). Gambel's oak, walnut, birchleaf buckthorn, Rosa and Prunus spp. were identified in the shrub layer. Forbs and grasses were moderately common.

The last reach (11) began approx. 0.4 km below Bear Valley. Canyon narrowed yet further, gradient remained steep, and flow was perennial. Young alder (10.0 - 15.0 cm DBH) and boxelder (10.0 - 20.0 cm DBH) dominated the channel vegetation. Mature aspen (Populus tremuloides) and Rosa sp. were also found streamside. All size classes of alder and boxelder were present.

Terraces were very narrow and sometimes absent (e.g. stretch above Bear Valley spring). They were dominated by Douglas-fir (10.0 - 30.0 cm DBH) and Gambel's oak (10.0 - 25.0 cm DBH). Shrub level was composed of young Douglas-fir and Gambel's oak plus dense growth of birchleaf buckthorn. Mountain spray (Holodiscus dumosus) replaced buckthorn next to talus slopes. Understory was dense consisting of geraniums and wild strawberry plus other assorted forbs, grasses and herbaceous plants. Rosa sp. was also present in scattered, dense clumps.

Cattle damage was most evident in reaches 5 - 7, and 9. Terraces exhibited heavy use through extensive trailing and large areas of exposed soil. Shrub midstory was sparse and understory was depauperate of grasses, forbs and herbaceous cover. Serious downcutting occurred in ephemeral reaches where terraces were cut 2.0 - 3.0 m above channel floor. Damage along channel was minimal probably since downcutting of stream restricted access. Narrow, steep reaches 8, 10, and 11 showed little or no indication of cattle damage.

Fish--Speckled dace (Rhinichthys osculus), the only species taken, were abundant but only occurred in reaches 5 and 6 (Table 2). Here

the creek was no wider than 1.0 m and averaged 0.1 to 0.2 m deep. Riffles were the predominant habitat, although pools and runs were also common. Cobbles, gravel, sand and bedrock comprised the substrate. In the middle reaches the creek channel was largely comprised of medium to large boulders. Pools, $\leq$ 1.0 m deep and up to 2.0 m across, were most common. A drop of approximately 2.0 m at the beginning of reach 5 was likely a barrier upstream to fish movement. Above the confluence with Yam Canyon, water flow was greatly reduced. Habitat was primarily characterized by pools 1.0 - 2.0 m across and < 0.5 - 1.5 m depth. The creek channel did not exceed 2.0 m and was strewn with small boulders. Cobble, gravel and sand, in order of dominance, comprised the substrate. Nostoc sp. occurred in all reaches except reach 11. Reaches 5 and 6 had the highest percentage of Nostoc sp. out of the 7 reaches.

Table 2. Means and ranges of CPUE, total length (mm), and weight (gr) for Rhinichthys osculus captured from Little Blue Creek on the Alma Mesa allotment 19 June 1988.

	Mean+/-Se (range)		
Total number of fish captured	CPUE (n=7) (range)	TL (n=44) (range)	WT (n=44) (range)
120	17.0±5.0 (2.0 - 46.0)	57.0±8.0 (40.0 - 82.0)	2.0±0.2 (1.0 - 6.0)

Yam Canyon [611.07303, Alma Mesa Quad, T2N,R31-32E. Elevation (ft): 6100 - 6200]

Yam Canyon was surveyed from its confluence with Little Blue Creek upstream 5.6 km 18 June (Fig. 4). The area surveyed was divided into 4 reaches.

Riparian--Reach 1 began at the mouth and continued to the new fence crossing the canyon. Canyon was fairly narrow, but with terrace development present. Substrate was dominated by cobbles, boulders, and some bedrock areas. Flow was perennial.

Channel vegetation consisted of a very sparse upper canopy of widely scattered mature alder (32.0 - 48.0 cm DBH). Alder (5.0 - 10.0 cm DBH) in discontinuous, but dense clumps dominated the understory layer with an occasional boxelder (10.0 - 15.0 cm DBH). The shrub midstory was absent as was the understory except for scattered monkey flower (Mimulus sp.). Reproduction was fairly vigorous for alder, but spotty for boxelder.

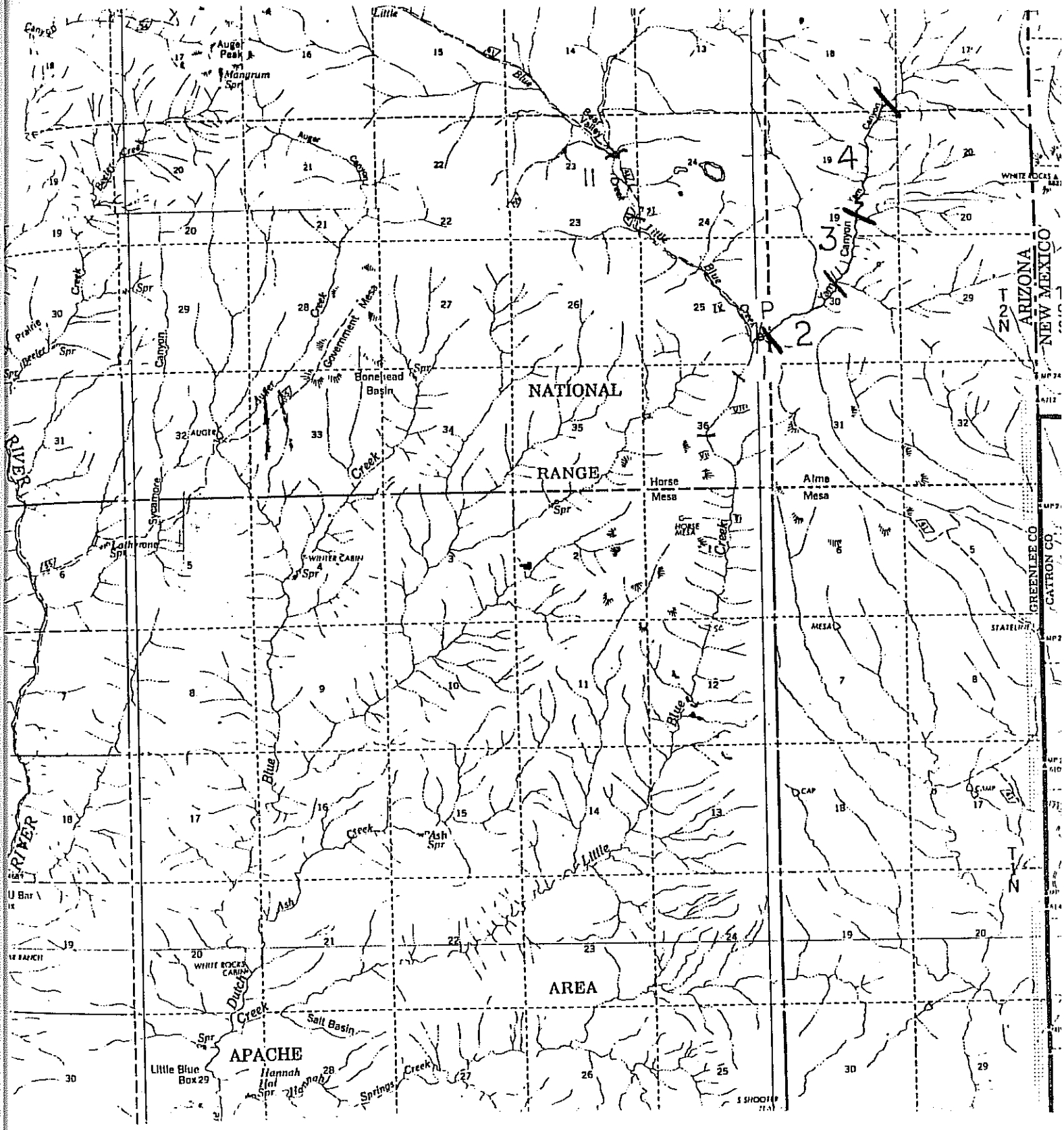
Terrace vegetation was dominated by ponderosa pine (25.0 - 35.0 cm DBH) in upper canopy. Widely scattered narrowleaf cottonwood (60.0 - 80.0 cm DBH) was also present at edge of terrace adjacent to channel. The understory tree level was dominated by Gambel's oak (15.0 - 25.0 cm DBH) with an occasional walnut the same size. A depauperate shrub midstory consisted of isolated birchleaf buckthorn growing between the protection of several tree trunks. Reproduction was absent for cottonwood and walnut. Dramatic downcutting had resulted in terraces cut 1.5 - 2.0 m above channel floor. Fallen large mature alder (40.0 - 50.0 cm DBH), ponderosa pine and boxelder were common. Banks were unstable. Exposed tree roots were common and some trees at terrace margin were dead and on verge of falling. This narrow canyon appeared to have been heavily damaged during the high flows of the 1983 flood.

Alders are hydrophytic trees with a shallow root system. The presence of large alder on terrace near fence in reach 1 suggests that the channel was once cut shallow and close to terrace surface. Since many of the alder abandoned on the terrace still survive, it is likely downcutting was due to a recent occurrence (perhaps flood of 1983). Although unaesthetic, the removal of a once dense upper canopy of alder had allowed vigorous reproduction of alder in the understory.

In reach 2 the canyon narrowed slightly, gradient was steeper, substrate was dominated by large boulders, some bedrock and other particle sizes, and flow was perennial.

Streamside vegetation was dominated by alder (10.0 - 20.0 cm DBH) with numerous larger individuals (25.0 - 40.0 cm DBH) scattered throughout stands. Co-dominant in upper portions of reach 2 was white fir (35.0 - 65.0 cm DBH). Dominant tree at understory level was boxelder (15.0 -20.0 cm DBH). Alder reproduction consisted of discontinuous large clumps of seedlings and saplings. Reproduction in boxelder was evident by small clumps of several individuals or isolated specimens. Shrub layer along channel was largely absent.

Terrace was dominated by white fir and Douglas-fir (50.0 - 70.0 cm DBH) in upper canopy. Reproduction by these two species was evident from presence of all size classes except seedlings (< 0.5 m). At lower end of reach 2 understory tree level was dominated by Gambel's oak, Arizona walnut and boxelder (10.0 - 20.0 cm DBH). Big-tooth maple (15.0 - 25.0 cm DBH) was dominant understory tree in upper and middle sections of reach. There were signs of reproduction for walnut, boxelder and Gambel's oak. Ponderosa pine (25.0 - 50.0 cm DBH) was a minor component of understory tree level. Hop-tree (Ptelea triofoliata) and birchleaf buckthorn dominated shrub layer with young walnut, ponderosa pine, boxelder and Rocky Mountain juniper also present. Various herbaceous plants, grasses and oregon grape (Berberis repens) were found in understory.



4. Map of Yam Canyon, reaches 1 and 2 on the Alma Mesa allotment.

Gradient of reach 3 was similar to that in reach 2. Substrate consisted of an assortment of particle sizes, but dominated by large boulders. Flow was ephemeral, however the presence of alders indicates subsurface flow.

Boxelder and walnut (10.0 - 15.0 cm DBH) formed a sparse upper canopy along channel. Understory tree level was dominated by small, discontinuous clumps of alder (5.0 - 10.0 cm DBH). Shrub layer was non-existent.

Terrace vegetation was quite similar to upper and middle portions of reach 2.

In reach 4 canyon continued to be narrow, but gradient steepened. Substrate remained the same and flow was ephemeral. Streamside vegetation was characterized by boxelder (15.0 - 20.0 cm DBH) and walnut (10.0 - 20.0 cm DBH) as tree understory dominants. Reproduction was present but spotty for both species. Shrub layer, and tree overstory were absent.

Terrace was dominated by large, mature Douglas-fir and white fir (30.0 - 60.0 cm DBH) in upper canopy with ponderosa pine (30.0 - 45.0 cm DBH) as co-dominant. At the understory tree level Gambel's oak and walnut (10.0 - 20.0 cm dbh) were most common. Shrub midstory was characterized by hopbush and birchleaf buckthorn with juniper the co-dominant. Oregon grape and poison ivy provided ground cover.

In reach 1 understory was severely trampled. There were many areas of bare, exposed soil. Gambel's oak seedlings had been heavily grazed resulting in stunting. In the remaining reaches trailing and cattle droppings were still visible and ground cover and shrub layer were not extensive, however, terrace vegetation was obviously recovering.

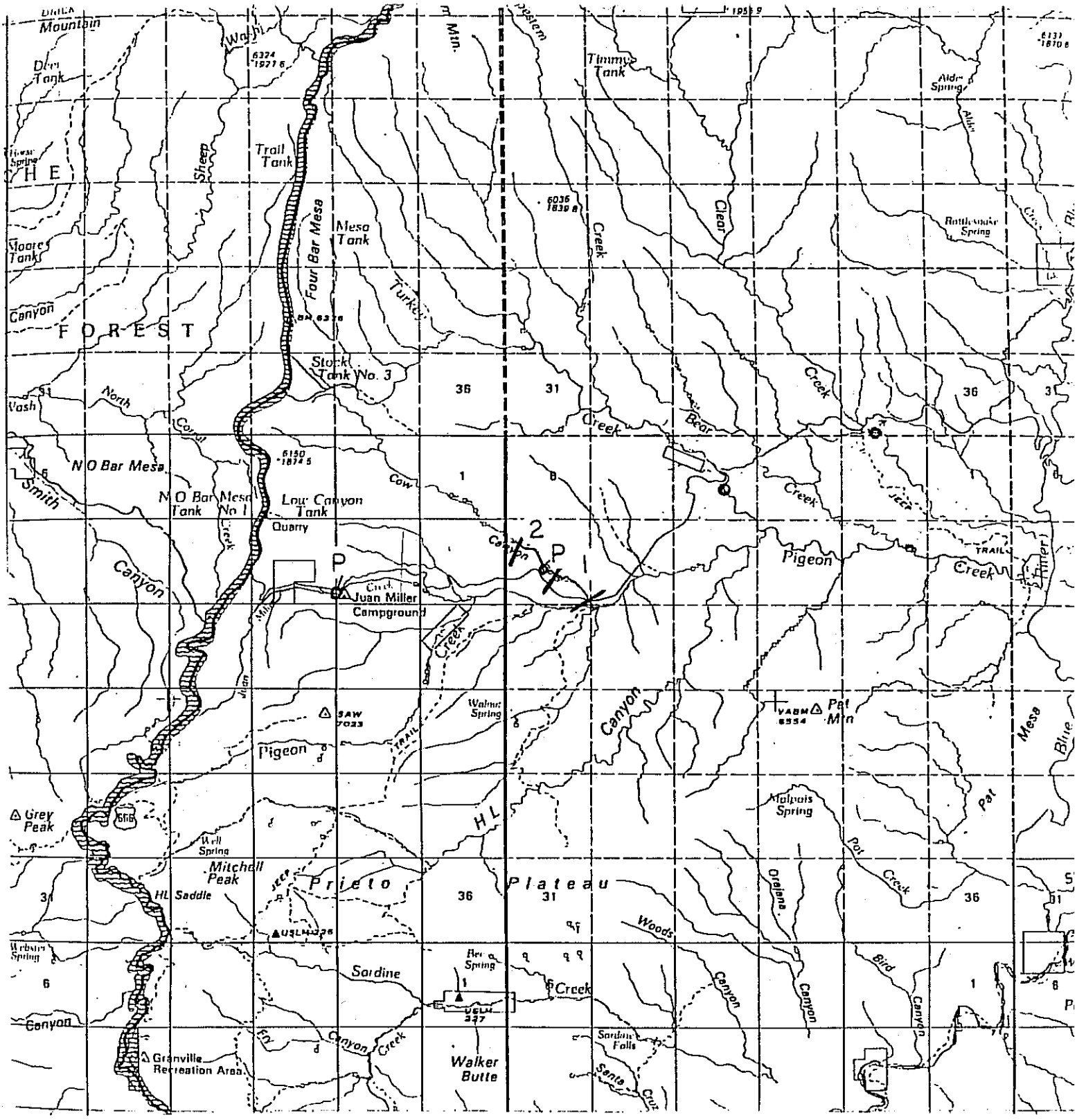
Fish--Fish were not observed. Surface water was intermittent with very little flow, but appeared perennial. The streambed was 1.0 - 2.0 m wide and consisted primarily of shallow pool habitat. Boulders, cobble, gravel and some bedrock describe the substrate.

N O Bar Allotment

Juan Miller Creek [611.07301, Pipestem Mtn. Quad, T2S,R29E,S11. Elevation (ft): 5640]

Juan Miller Creek was surveyed near the spring at Lower Juan Miller Campground 3 February (Fig. 5).

Riparian--Canyon was of medium width with well developed, but narrow, terraces. Gradient was shallow, substrate dominated by cobbles, and flow presumed perennial.



5. **Map of Juan Miller Creek on N O Bar allotment and Cow Canyon, reaches 1 and 2 on the Pigeon allotment.**

Upper canopy was closed along stream and dominated by mature alder (20.0 - 30.0 cm DBH). Understory tree level was dominated by scattered mature boxelder (15.0 - 25.0 cm DBH). Gambel's oak and sycamore were present, but less common. No shrub midstory observed. There were some young alder trees (10 - 15 cm DBH), but no visible seedlings or saplings.

Grazing impact was not noted due to winter season and leaf litter.

Fish--No fish were taken in 595 seconds of electrofishing. The stream in this stretch is no wider than 1.0 m and 0.2 m deep. The dominant habitat consisted of riffles flowing over cobbles. Water temperature was a consistent 11° C.

Pigeon Allotment

Cow Canyon [611.07301, Pipestem Mtn. Quad, T2S,R30E,S7. Elevation (ft): 4920 - 5000]

Cow Canyon was sampled on 4 February 0.5 km upstream from where it crosses FS road 475 (Fig. 5). Two reaches were identified.

Riparian--In reach 1 terraces were wide and well developed, gradient was moderate and boulder dominated substrate.

Canopy was open with upper level dominated by sycamore (> 50.0 cm DBH). Arizona oak (25.0 - 40.0 cm DBH) was dominant in understory layer. No shrub midstory encountered along stream. Reproduction was not evident in winter.

Terrace consisted of same sycamore/Arizona oak community with juniper (Juniperus sp.) co-dominant within understory tree level. Canyon narrowed and gradient steepened in reach 2. Terraces were well developed but narrow. This reach was presumed perennial because of extensive bedrock at surface and the small springs immediately upstream. Summer flows are probably not more than a trickle. Canopy was open. Upper canopy was absent except for rare sycamore (40.0 - 50.0 cm DBH) or ash (Fraxinus pennsylvanica; 20.0 - 30.0 cm DBH). Understory tree level was dominated by alder (1.0 - 5.0 cm DBH) growing in small dense patches. Alder were found in pockets of shallow alluvial gravels and sands deposited on bedrock. Reproduction consisted of small dense stands of alder seedlings.

Terraces were dominated by Arizona oak and juniper.

Channel and terrace were heavily used by cattle as indicated by extensive trailing, exposed soil, and broken shrubs. Steeply cut banks were noted.

Fish--No fish were taken in 426 seconds of electroshocking. Stream width was approx. 2.0 - 3.0 m and mean depth 0.2 m. Pools, riffles and runs were equally well represented. Bedrock was the major substrate component. Cobble and gravel made-up a smaller percentage of the streambed. The water temperature was a consistent 6° C.

Turkey Creek [611.07301, Pipestem Mtn. Quad, T2S,R30E. Elevation (ft): 4640 - 4680]

Turkey Creek was sampled 6 February from approximately 0.3 km above FS road 475 to 0.3 km below road crossing (Fig. 6). Two reaches were described.

Riparian--The first reach was just upstream from FS road 475 crossing. The canyon was wide, at a moderate grade and with an open canopy. Terraces were well developed, and in fact had been cleared for fields by the nearby ranch. Bedrock dominated the substrate. Flow was perennial, but probably greatly reduced in dry months.

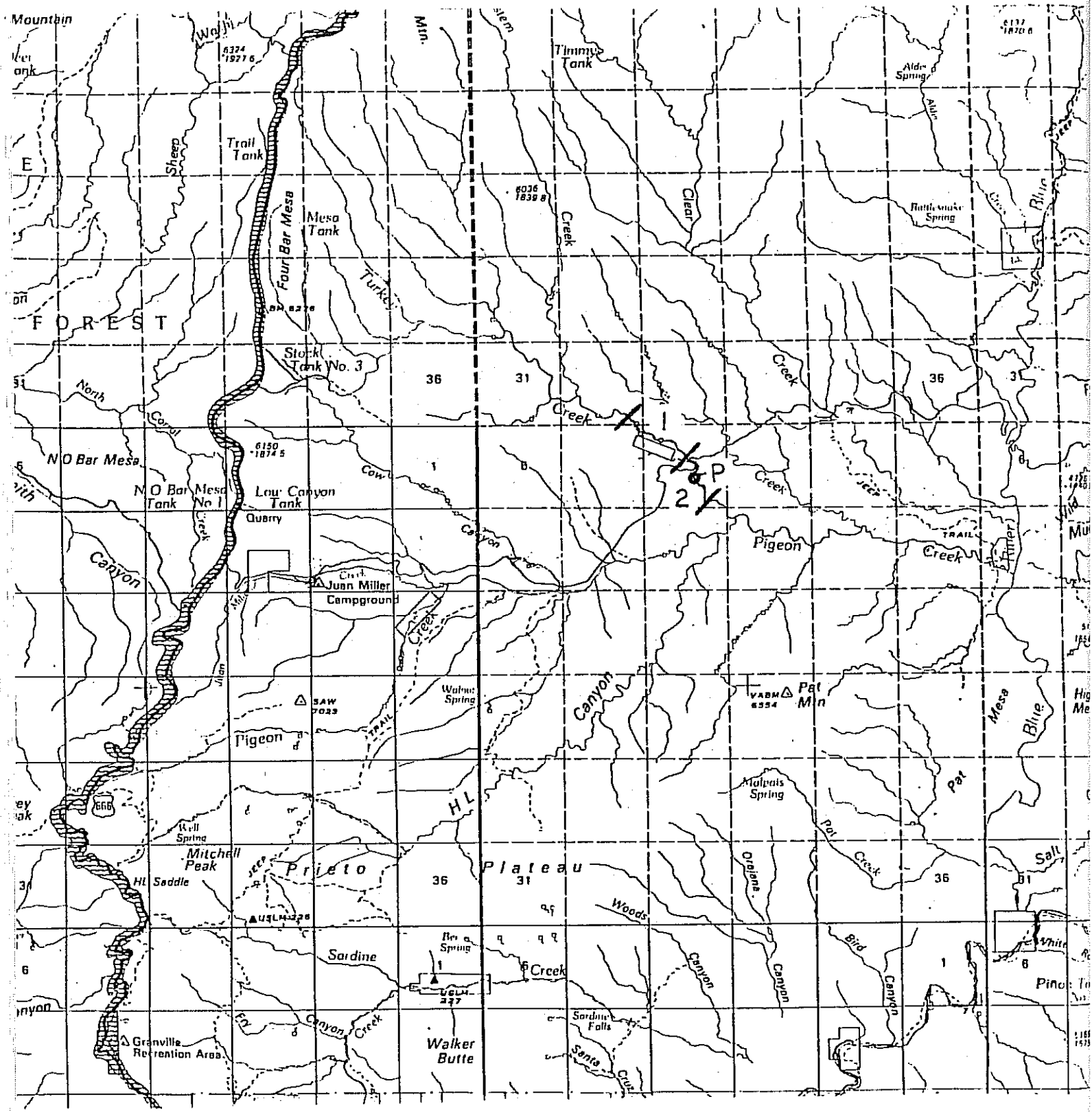
The upper canopy at streamside was dominated by alder (10.0 - 15.0 cm DBH) growing in widely scattered groves. Occasional, isolated sycamores (> 50.0 cm DBH) were co-dominant within the upper canopy. The understory tree level was also dominated by alder (5.0 - 10.0 cm DBH). No shrub midstory present. Terraces, though agricultural, had scattered sycamore (> 50.0 cm DBH).

Reach 2 began immediately above road crossing and extended to first major falls. Canyon was wide enough to allow good terrace development, gradient was steep, and substrate was dominated by large boulders with scattered outcroppings of bedrock. Flow was, as in Reach 1, perennial.

Canopy along stream was dense. Upper canopy was dominated by alder (25.0 - 40.0 cm DBH). Ash (25.0 - 35.0 cm DBH) were co-dominant. Understory tree level was represented by ash (10.0 - 15.0 cm DBH). Reproduction consisted of small discontinuous stands of alder and ash saplings (5.0 - 10.0 cm DBH).

Terraces were also densely vegetated. Sycamore (> 50.0 cm DBH) dominated with ash (25.0 - 35.0 cm DBH) the co-dominant.
Below this reach the canyon narrowed substantially while gradient increased. A series of falls occurred with the highest approaching 9.0 m. Terraces had been extensively trailed by cattle and campers. Grasses and herbaceous species existed but some damage was evident.

Fish--Longfin dace (Agosia chrysogaster) was found in abundance (Table 3). Turkey Creek was high and turbid from runoff. The creek averaged 7.0 m wide and 0.5 m deep. Fish were concentrated in eddys, connected backwaters and slow margins of riffle/run habitat over a wide range of substrates. Water temperature was a consistent 6° C.



6. Map of Turkey Creek, reaches 1 and 2 on the Pigeon allotment.

Table 3. Mean CPUE, standard length (mm), weight (gr), and population estimate with 95% C.I. for Agosia chrysogaster captured from Turkey Creek 6 February 1988.

Total number of fish captured	Mean +/-Se (range) CPUE (n=11)	SL (n=49)	WT (n=49)	Pop. estimate (per 6.0 m of riffle)
469	40.0±22.0 (0 - 181)	44.0±6.0 (18 - 79)	2.0±0.3 (1 - 10)	51.0 (32 - 70)

Sandrock Allotment

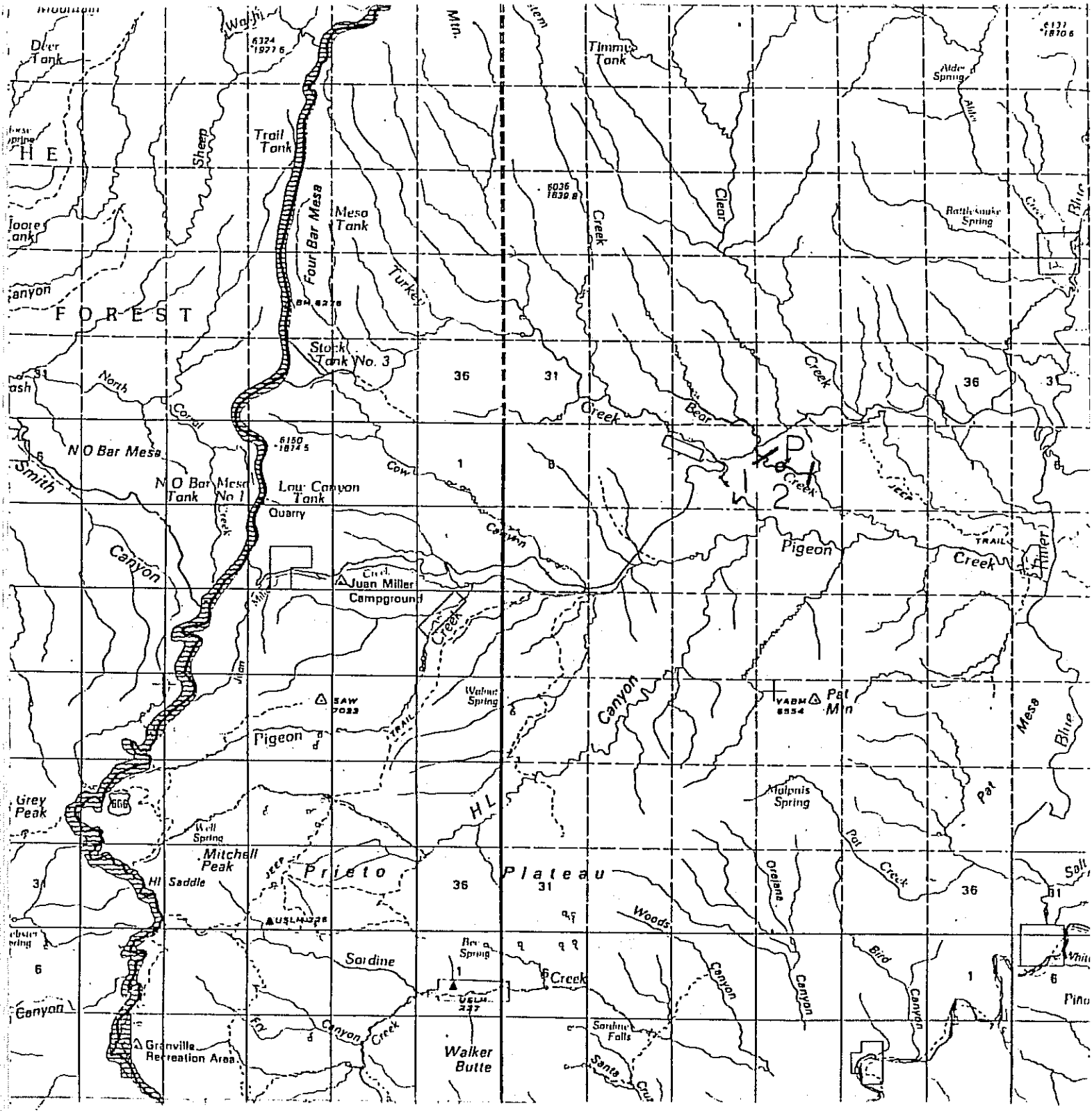
Bear Creek [611.07301, Fritz Canyon Quad, T2S,R30E. Elevation (ft): 4400 - 4520]

Bear Creek was surveyed 5 February from FS road 475 crossing downstream 4.8 km. Two reaches were described (Fig. 7).

Riparian--Reach 1 extended below road crossing to where canyon opened up. This reach was very much like Reach 2 on Clear Creek. Canyon was narrow, with a steep gradient, substrate dominated by boulders and ephemeral flow. Vegetation occurred on alluvial deposits next to canyon walls. Upper canopy was not particularly dense and was dominated by sycamore (> 50.0 cm DBH). Understory tree level was dominated by ash (10.0 - 15.0 cm DBH). Scouring seems to have removed both shrub midstory and herbaceous understory.

In Reach 2 canyon broadened and gradient decreased. Terraces were well developed and 0.5 - 2.0 m above stream. Boulders and cobbles dominated substrate. Information provided by a local rancher and the presence of springs indicated this reach was probably perennial.

Along the stream the upper canopy was dominated by alder (30.0 - 40.0 cm DBH) with ash (25.0 - 35.0 cm DBH) co-dominant. No understory tree level existed due to the dense canopy. Old, large alder and ash were commonly found fallen across the stream. In this mature riparian forest little recruitment was present. Reproduction consisted mainly of alder seedlings and saplings (1.0 - 3.0 cm DBH). These were found in only one location where a gap in the canopy had formed when several large alder and ash had died and fallen. There was no shrub midstory, but grasses did occur at streamside.



7. Map of Bear Creek, reaches 1 and 2 on the Sandrock allotment.

Terrace upper canopy was dense and dominated by sycamore (> 50.0 cm DBH) with ash (25.0 - 35.0 cm DBH) co-dominant. The understory tree level was dominated by boxelder (20.0 - 30.0 cm DBH). The understory was densely covered with grasses and herbaceous species.

Livestock damage was primarily due to horse trails. Overall, very little negative impact was apparent.

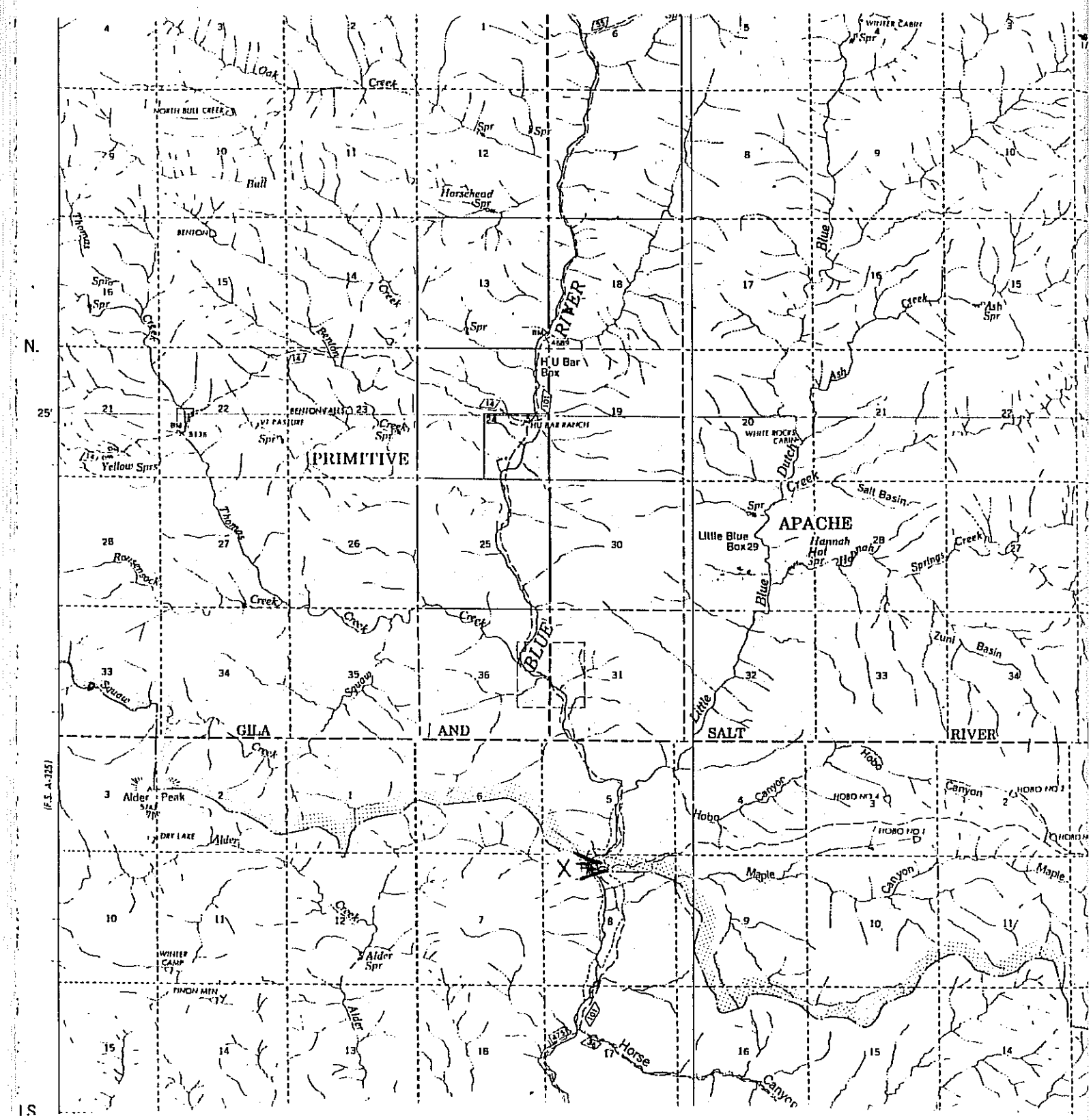
Fish--Fish were not observed. The creek was high and turbid from runoff. Average width of Bear Creek was 5.0 m and 0.5 m deep. Habitat primarily consisted of riffles and rapids.

Blue River [611.073, Fritz Canyon Quad, T1S,R31E,S8. Elevation (ft): 4440]

Blue River was sampled for fishes near Baseline Camp 12 June 1988 (Fig. 8).

Riparian--The vegetation at the stream margin consisted primarily of Seep-willow (Baccharis salicifolia) and young cottonwood (Populus sp.), sycamore, and alder. Mature sycamore (> 40 cm DBH) were isolated and widely scattered.

Fish--Speckled dace (Rhinichthys osculus), loach minnow (Tiaroga cobitis), Gila sucker (Catostomus insignis), Gila mountain-sucker (Pantosteus clarki), and rainbow trout (Salmo gairdneri) were collected (Tables 4 and 5). Riffles and runs were the most common aquatic habitat. Pools, although rare, had an abundance of fish as exemplified by a catch of 35 adult Gila sucker from one pool 2.0 m across and 40 cm deep. In general, the river was broad (4.0 m) and shallow (10 - 20 cm) with a mostly cobble substrate.



8. Map of Blue River on the Sandrock allotment.

Table 4. Total number and relative abundance of species captured from the Blue River on the Sandrock allotment 12 June 1988.

Species	Total number	Relative abundance (%)
Native species		
Catostomus insignis	40	48
Pantosteus clarki	9	11
Rhinichthys osculus	23	27
Tiaroga cobitis	8	9
Non-native species		
Salmo gairdneri	4	5
Total	84	
%Native		95
% Non-native		5

Table 5. Mean CPUE (n=10), total length (mm) and weight (gr) of fish captured in the Blue River on Sandrock allotment 12 June 1988.

Species	CPUE±Se (range)	TL±Se (n) (range)	WT±Se (n) (range)
Catostomus insignis	1.4±0.4 (0 - 4.0)	40.0±5.0 (3) (30.0 - 57.0)	------
Pantosteus clarki	0.9±0.4 (0 - 3.0)	82.0±4.0 (9) (112.0 - 69.0)	4.0±0.7 (9) (3.0 - 11.0)
Rhinichthys osculus	2.1±0.9 (0 - 8.0)	58.0±3.0 (21) (34.0 - 82.0)	1.0±0.2 (21) (1.0 - 3.0)
Tiaroga cobitis	0.7±0.4 (0 - 4.0)	58.0±1.0 (8) (52.0 - 61.0)	1.0±0.2 (8) (1.0 - 2.0)
Salmo gairdneri	0.4±0.1 (0 - 1.0)	175 (2) (163.0,187.0)	56 (2) (47.0,68.0)

Blue River [611.073, Fritz Canyon Quad, T2S,R30E,S6-7. Elevation (ft): 4200]

Historical Data.

September, 1987 1.6 km downstream from FS road 475 Arizona Game and Fish Department (AGFD) personnel recaptured 1 razorback sucker (Xyrauchen texanus) from prior experimental stockings.

Clear Creek [611.07302, Fritz Canyon Quad, T1-2S,R30E,S2-35. Elevation (ft): 4560]

Clear Creek was sampled 5 February from 100 m upstream of FS road 475 crossing to approx. 3.0 km downstream (Fig. 9). Two reaches were described.

Riparian--Reach 1 extended from slightly above FS road 475 crossing to where canyon narrowed. Terraces were well developed, gradient moderate and substrate dominated by bedrock. Flow may be perennial, but probably reduced to a trickle in summer.

Canopy along stream was open. Vegetation consisted of young trees (1.0 - 5.0 cm DBH). There was no upper canopy along stream. Understory tree level was dominated by alder and ash. Cottonwood (Populus sp.; 1.0 - 5.0 cm DBH) were co-dominant. Shrub-sized saplings of alder, ash, cottonwood and sycamore formed the shrub midstory. Seep-willow though present in the shrub midstory, was a minor component.

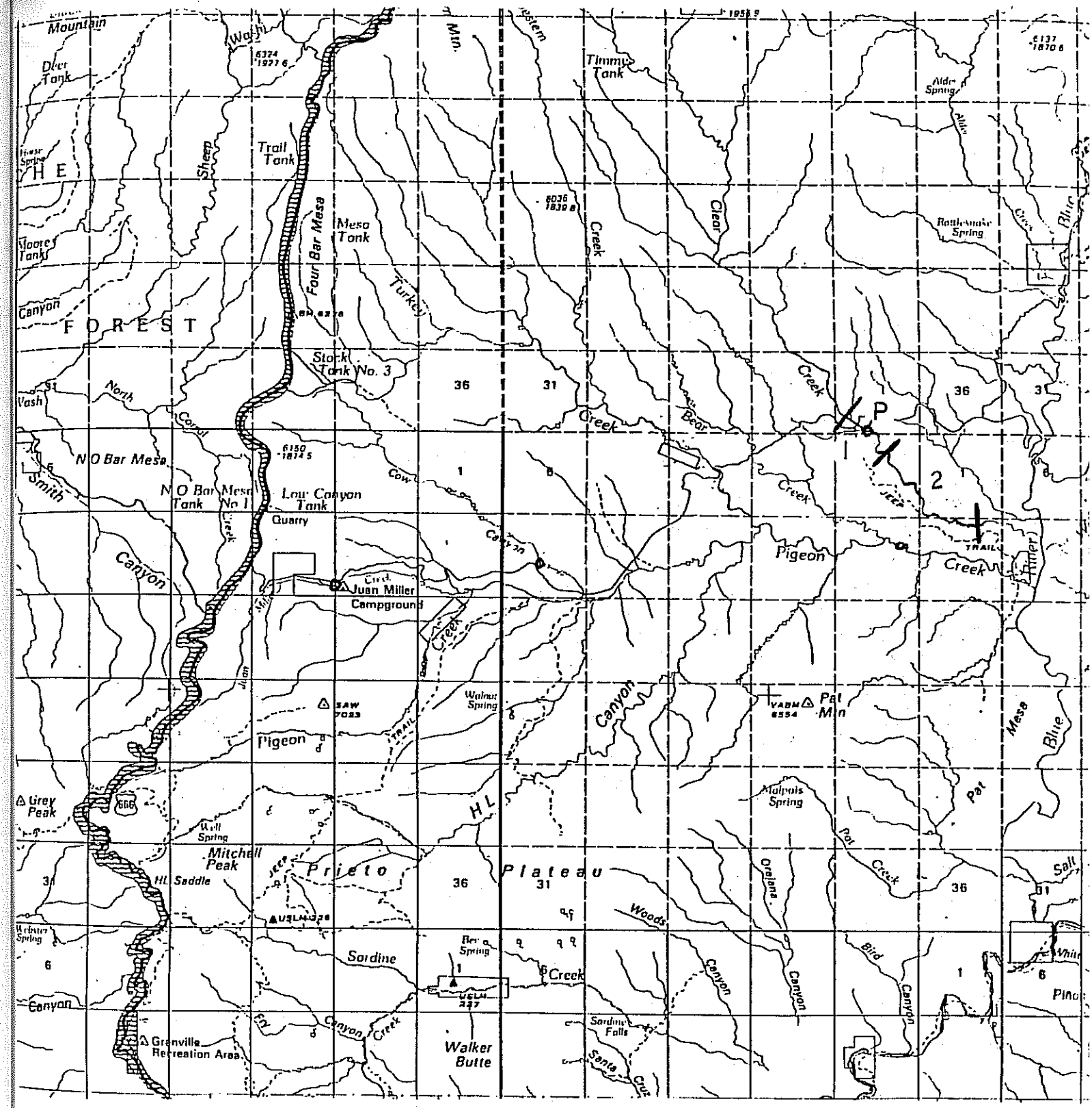
Terraces were dominated by sycamore (> 50.0 cm DBH) in the upper canopy. Juniper (Juniperus sp.; 15.0 - 25.0 cm DBH) dominated understory tree level.

Canyon narrowed in reach 2 with canyon walls often immediately adjacent to stream. Gradient was steep and substrate was dominated by boulders. Flow was ephemeral.

Vegetation was restricted to alluvial deposits adjacent to canyon walls. Upper canopy was dominated by sycamore (> 50.0 cm DBH). Understory tree level was dominated by ash (10.0 - 15.0 cm DBH). No shrub midstory or understory present due to flood scouring.

Understory heavily trailed by cattle with exposed, bare soil surfaces present. Scouring from floods evident; most ash bore trunk scars.

Fish--No fish were taken in 1,986 seconds of electrofishing. The creek was high and turbid from runoff. Average width was 6.0 m and depth 0.5 m. Bedrock, cobble and boulder, in order of dominance, made-up the substrate. Habitat consisted principally of riffles and less commonly pools. The water temperature was a consistent 9° C.



9. **Map of Clear Creek. reaches 1 and 2 on the Sandrock allotment.**

Hannah Springs Creek [611.073031, Dutch Blue Quad, T1N,R31E,S29-28. Elevation (ft): 4880 - 4960]

Hannah Springs Creek was surveyed 14 June from the mouth at Little Blue Creek to 1.5 km upstream (Fig. 10). This section of stream was described as two distinct reaches.

Riparian--The first reach extended from the mouth to the thermal springs. Here the canyon was narrow with a steep gradient (_6%). Predominant substrate was bedrock and there were no terraces.

The scarce vegetation occurred in pockets of boulders or cobbles deposited among bedrock outcrops. Trees existed in small areas on inside of bends and behind bedrock barriers. Upper canopy was absent. Understory tree level was dominated by alder (10.0 - 15.0 cm DBH) growing in small clumps. Ash (8.0 - 12.0 cm DBH) was co-dominant. Cottonwoods (Populus sp.; 8.0 - 12.0 cm DBH) were scattered amongst the alder clumps. Hackberry (Celtis reticulata) clung to hillsides. Silk tassel dominated the sparse shrub layer which abutted canyon walls. Reproduction for all species was evident. Alder reproduction was vigorous, comprised mostly of clumps of young saplings (1.0 - 3.0 cm DBH). Cottonwood seedlings were widely scattered.

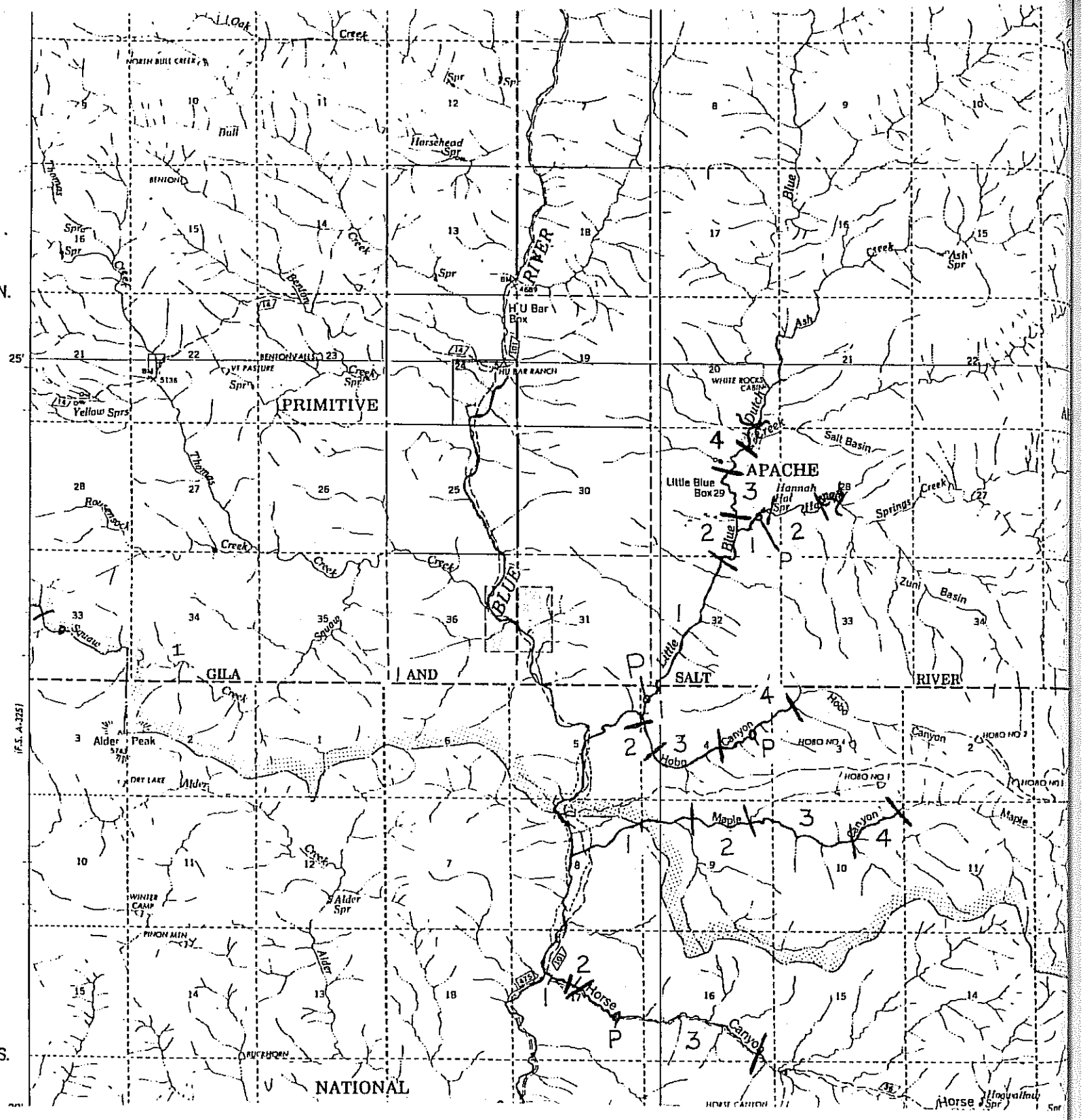
The second reach began above the falls at the thermal springs. The canyon narrowed to 4.0 - 6.0 m wide and the gradient increased slightly. Bedrock continued as the dominant substrate with enormous boulders and talus blocks. Because of the narrow floodplain this reach was highly scoured. Stranded logs were visible lodged between canyon walls 5.0 - 7.0 m above creek.

There was very little riparian vegetation. A few trees alder and ash (5.0 - 7.0 cm DBH) existed in isolated clumps in protected areas of bends and behind barriers. This reach culminated in a very constricted, steeply graded stretch (>10%). The stream descended through 4 dropoffs totalling approximately 15.0 m. These were separated by closely spaced plunge pools . The reach ended at a massive log jam which blocked upstream access to the creek.

There was no evidence of cattle in this creek. Although the water appears perennial, the ruggedness of this canyon prevents cattle access.

Fish--Speckled dace (Rhinichthys osculus) and longfin dace (Agosia chrysogaster) were taken in the first reach below thermal springs and the first barrier falls (Table 6). Fish were taken in pool/riffle habitat. Creek averaged 2.0 m across and 0.3 m deep. Substrate consisted of bedrock, boulder, cobble and gravel, in order of dominance. Longfin dace were coppery colored and many were tuberculate. Some speckled dace showed light red coloration at base of fins. Thus, both species appeared to be in active reproductive

condition. Water temperature was a consistent 12° C.



10. Map of Horse, Maple, and Hobo Canyons and Little Blue and Hannah Springs Creeks with corresponding reaches on the Sandrock allotment.

Table 6. Number of species, relative abundance (%) and mean total length (mm) and weight (gr) of fish captured from Hannah Springs Creek on the Sandrock allotment 14 June 1988.

Species	TTL number captured	Relative abundance	TL±Se (n) (range)	WT±Se (n) (range)
Agosia chrysogaster	34	56	67.0±9.0 (6) (22.0 - 95.0)	6.0±2.0 (6) (<1.0 - 15.0)
Rhinichthys osculus	27	44	77±3.0 (25) (41.0 - 90.0)	5.0±0.5 (25) (<1.0 - 9.0)

Hobo Canyon [611.07303, Fritz Canyon and Dutch Blue Quads, T1S,R31E,S5-4. Elevation (ft): 4800 - 5000]

Hobo Canyon was surveyed 11 June from its mouth at Little Blue Creek 3.0 km upstream (Fig. 10). The section of Hobo Canyon surveyed is described as 4 distinct reaches.

Riparian--Reach 1 started at the mouth and continued at a 6 - 10% gradient upstream ending at the first steep dropoff. The substrate was dominated by large boulders and talus blocks. Flow in this reach was ephemeral.

Vegetation, in the upper canopy, was dominated by scattered sycamores (35.0 - 50.0 cm DBH). Boxelder (10.0 - 20.0 cm DBH) dominated the understory tree level. Co-dominant was walnut (15.0-25.0 cm DBH).

Terraces were not developed in this reach.

In reach 2 flow became perennial. Narrowness of canyon, gradient, substrate and terrace development remain as for reach 1. Upper canopy was dominated by alder (8.0 - 15.0 cm DBH) growing in a narrow continuous band along stream. Young alder (4.0 - 6.0 cm DBH) were common. Dominant trees in understory level were boxelder and walnut (6.0-10.0 cm DBH). Reproduction was evident for alder, boxelder and walnut; with the latter two species appearing less active than the alder.

The canyon opened up and became less steep in reach 3. Here terraces were well developed and substrate was a mixture of various particle sizes. Upper canopy along the stream was dominated by alder (10.0 - 15.0 cm DBH) with scattered individuals (25.0 - 35.0

cm DBH). Stands were often dense with vigorous reproduction in the form of saplings (2.0-4.0 cm DBH). Boxelder and ash (30.0 - 40.0 cm DBH) dominated the understory tree layer. Walnut (25.0 - 30.0 cm DBH) co-dominated the understory tree layer. Reproduction was vigorous for all species. Alder seemed to reproduce in dense clumps while vigorous reproduction for boxelder, ash and walnut consisted of numerous, but single, individuals.

Terraces were cut high above the channel floor 2.0 - 4.0 m. Vegetation dense along terrace with upper canopy dominated by ash (45.0 - 60.0 cm diam. DBH). Walnut was the co-dominant tree in the upper canopy. Isolated cottonwood (Populus sp.; > 90.0 cm DBH) were found scattered on terrace. Understory tree layer was dominated by boxelder (15.0 - 30.0 cm DBH) with Gambel's oak (15.0 - 25.0 cm DBH) a distant co-dominant. Shrub layer was fairly dense, dominated by birchleaf buckthorn. Boxelder seedlings <0.5 m high were found, indicating successful reproduction on the terrace. Vigorous reproduction of walnut and Gambel's oak also occurred on terrace. Grasses and herbaceous cover fairly dense.

Reach 4 began above spring on Hobo Canyon. Flow was ephemeral, substrate dominated by bedrock, canyon narrowed, terraces were completely lacking, and gradient steepened.

Vegetation was absent from channel.

Cattle damage was restricted to reach 3 with moderate trailing, and light trampling of shrub midstory on terrace. Appears either cattle had not been present long, and/or cattle were few in number.

Fish--No fish were taken. Average stream width of Hobo Canyon was 3.0 m. Mostly shallow riffle habitat flowing over cobble or bedrock dominated, but also some good size pools 1.0 m deep. Cladophora sp., Nostoc sp., and Nasturtium sp. were common.

Horse Canyon [611.073, Fritz Canyon Quad, T1S,R31E. Elevation (ft): 4400 - 4580]

Horse Canyon was sampled 9 June from its mouth to 3.2 km upstream (Fig. 10). This section of Horse Canyon was considered in 3 reaches.

Riparian--Reach 1 comprised the stretch of Horse Canyon from its mouth approximately 0.8 km to beginning of perennial flow. Horse Canyon began at the Blue River as a narrow canyon with a large fan made up of boulders - possibly deposited by flood. This reach was characterized by ephemeral flow over a cobble/boulder substrate. Riparian vegetation consisted of occasional, isolated, mature sycamore (25.0 - 35.0 cm DBH) and walnut (10.0-20.0 cm DBH). Upland trees, however, dominated vegetation in this reach. Emory oak (Quercus emoryii), gray oak (Quercus grisea), Juniperus sp., western

soapberry (Sapindus saponaria) and hackberry existed as small stunted shrubs/trees at the interface of canyon wall and stream.

No terrace development was noted within this reach.

Reaches 2 and 3 were within the perennial portions of the canyon. Reach 2 had a steeper gradient in which the canyon narrowed and bedrock dominated.

Vegetation in reach 2 consisted of a narrow discontinuous band of alder in clumps consisting of seedlings and saplings (1.0 - 3.0 cm DBH). Fremont's cottonwood (Populus fremontii) and sycamore formed thickets in open spaces between and at margins of alder clumps. Young cottonwoods (0.5 - 2.0 cm DBH) and numerous seedlings were abundant. Sycamores occurred primarily as seedlings with an occasional sapling (< 1.0 cm DBH).

Terrace development was present but very limited. Terraces did not appear to be abandoned floodplain so much as deposits tucked into pockets within the canyon walls. Mature sycamore (> 30.0 cm DBH) dominated the upper canopy of these very narrow terraces. Emory oak dominated the understory tree level.

Reach 3 had the lowest gradient. The canyon opened up and terraces, although narrow, were well developed.

Dense alder thickets (3.0 - 7.0 m wide) dominated streamside vegetation. All age classes of alders were represented but trees 6.0 - 14.0 cm DBH, which comprised the upper canopy, were the most numerous. The understory tree layer was dominated by smaller alder (3.0 - 6.0 cm DBH). Larger specimens of alder (15.0 - 25.0 cm DBH) were scattered. At outer edges of alder thickets, where insolation is higher, cottonwood and ash saplings (< 2.0 cm DBH) occurred in small clumps. Isolated individuals of Gooddings willow (Salix gooddingii; <2.0 cm DBH) also existed at edges of alder thickets. At 1.6 km upstream of mouth boxelder began appearing next to channel and on terrace as mature trees (15.0 - 25.0 cm DBH). Shrub midstory along channel was dominated by young and mature seep-willow (> 2.0 m). Seep-willow occurred in discontinuous but widespread clumps.

Terraces were dominated by sycamore (> 48.0 cm DBH) in the upper canopy. Larger cottonwood (> 65.0 cm DBH) also on terrace, were uncommon. The understory tree level was dominated by emory oak (15.0 - 35.0 cm) with juniper co-dominant.

Cattle signs first appeared approximately 1.6 km from mouth, however, damage did not become apparent until 2.0 km above mouth. Trailing on terraces was evident, but use was moderate since seedheads were still common on grasses. Damage seemed to progressively increase upstream. At 2.4 km from mouth trampling along channel was clearly seen. Alder saplings and seedlings

exhibited lateral growth and there were some broken/trampled seedlings.

Fish--Longfin dace (Agosia chrysogaster) and speckled dace (Rhinichthys osculus) were taken in Horse Canyon in riffle/pool habitat of reaches 2 and 3 (Table 7). Stream averaged 0.5 m wide and 0.1 m deep. Sand, cobble and bedrock comprised the substrate. Cladophera sp. was dense in places. Nasturtium sp. and Nostoc sp. were common. Water temperature ranged from 18° C to 23° C.

Table 7. Total number and mean CPUE, total length (mm) and weight (gr) of species captured in Horse Canyon on the Sandrock allotment 9 June 1988.

Species	Total number	CPUE±Se (n) (range)	TL±Se (n) (range)	WT±Se (n) (range)
Agosia chrysogaster	18	6.0±2.0 (3) (2 - 8)	56.0±1.0 (18) (47.0 - 65.0)	2.0±0.1 (18) (1.0 - 3.0)
Rhinichthys osculus	8	3.0±1.0 (3) (0 - 5)	62.0±4.0 (7) (54.0 - 84.0)	3.0±1.0 (7) (1.0 - 6.0)

Little Blue Creek [611.07303, Dutch Blue Quad, T1S-N,R31E. Elevation (ft): 4680 - 4800]

Little Blue Creek was surveyed 13 - 14 June from its confluence with the Blue River upstream 5.2 km to its confluence with Dutch Blue Creek (Fig. 10). Little Blue Creek on the Sandrock allotment was considered in 4 reaches, numbered 1 - 4.

Riparian--The first reach was characterized by perennial flow, shallow gradient, an assortment of substrate particle sizes, and narrow but well raised terraces. Flow was not continuous to the Blue River, disappearing into cobble and sand substrate at the mouth.

Riparian vegetation along the channel was dominated by alder. Portions of Reach 1 had larger mature individuals (13.0 - 20.0 cm DBH) with vigorous reproduction and many individuals in sapling (5.0 - 10.0 cm DBH) age class.

Upper canopy on terrace was dominated by sycamore (25.0 - 50.0 cm DBH). Similarly sized walnut and ash also dominated understory tree level. Juniper species were co-dominant. Shrub layer was represented by shrub-sized juniper saplings. Co-dominant were mesquite (Prosopis sp.) and Brickellia sp. There was limited reproduction of terrace species. Only an occasional sycamore,

cottonwood (Populus sp.), ash sapling (3.0 - 5.0 cm DBH) or young ash tree (10.0 - 12.0 cm DBH) was encountered.

The canyon narrowed in Reach 2. Here the gradient was shallow, and the substrate was dominated by cobbles and gravel.

Vegetation consisted of trees clinging to solution pockets or cracks in canyon walls and behind large boulders. Dominant tree was alder (15.0 - 20.0 cm DBH), with most size classes present. Alder seedlings occurred in dense but discontinuous clumps. The number of ash seedlings and saplings indicated fairly vigorous reproduction. The latter were present on gravel bars in smaller, less dense, widely scattered clumps.

Reach 3 extended through Little Blue Box. Canyon narrowed substantially to about 6.0 m wide, gradient increased slightly, substrate was dominated by large boulders, and flow was perennial.

Minimal riparian vegetation consisted of mature, somewhat stunted, ash (8.0 - 15.0 cm DBH) clinging to deposition pockets at curves.

The canyon broadened and opened up in reach 4. Gradient decreased somewhat but remained 3.0 - 6.0%. Substrate was composed of a variety of particle sizes, and terraces were well developed. Water flowed in from a spring on stream right a few hundred meters above the box, but from that point upstream the creek was dry.

Streamside vegetation was sparse but dominated by ash and walnut (10.0 - 15.0 cm DBH). Shrubs were absent except for widely scattered clumps of shrub-size cottonwood and ash saplings (1.0 - 2.0 cm DBH).

Terrace was dominated by sycamore (30.0 - 45.0 cm DBH) in upper canopy. Understory tree level was dominated by walnut, with co-dominant ash (both 10.0 - 15.0 cm DBH). Shrub layer and grasses were nearly absent.

Old trailing and a few areas of exposed soil were visible on terraces in reach 1 indicating cattle had once been in this reach, but shrubs and grasses were well on way to recovering. In narrow reach 3 the major disturbance was caused by scouring as evidenced by logs (25.0 cm) lodged between walls 8.0 m above ground. Recent cow sign was obvious in reach 4. Cattle traffic and use was heavy. Terrace was covered by many areas of exposed soil, grasses lacked seedheads and broken remnants of shrubs were visible.

Fish--Longfin dace (Agosia chrysogaster), speckled dace (Rhinichthys osculus), and Gila mountain-sucker (Pantosteus clarki) were noted throughout the entire stretch surveyed (Tables 8 and 9). Habitat consisted mostly of riffles and fewer pools. Substrate was cobble and boulder, with some gravel. Water temperature for reach 1 was 19° C and 23° C for reach 2.

Table 8. Total number, relative abundance (%), population estimate with 95% C.I. and mean total length (mm) and weight (gr) for species captured in reach 3 of Little Blue Creek on the Sandrock allotment 13 June 1988.

Species	Total number	Relative abundance	TL±Se (n) (range)	WT±Se (n) (range)	Population estimate ±Se (per 10.0 m of riffle)
Agosia chrysogaster	6	7	57.0±8.0 (6) (38.0 - 86.0)	3.0±1.0 (6) (1.0 - 8.0)	7 (3 - 11)
Pantosteus clarki	2	2	161 (2)	49 (2)	---
Rhinichthys osculus	78	91	59.0±2.0 (77) (31.0 - 95.0)	2.0±0.2 (77) (<1.0 - 8.0)	84 (53 - 115)

Table 9. Total number, and mean CPUE, total length (mm) and weight (gr) for species captured in reach 1 of Little Blue Creek on the Sandrock allotment 14 June 1988.

Species	Total number	CPUE±Se (n) (range)	TL±Se (n) (range)	WT±Se (n) (range)
Agosia chrysogaster	59	6.0±4.0 (4) (0 -18)	34.0±1.0 (8) (25.0 - 37.0)	<1.0
Rhinichthys osculus	73	14.0±2.0 (4) (8 - 20)	51.0±2.0 (46) (15.0 - 80.0)	2.0±0.3 (46) (<1.0 - 5.0)

Maple Canyon [611.073, Fritz Canyon Quad, T1SR31E. Elevation (ft): 4480 - 5600]

Maple Canyon was surveyed 10 June from its confluence with Blue River to 4.4 km upstream (Fig. 10). Maple Canyon was dry throughout the stretch surveyed which was divided into 4 reaches.

Riparian--The first reach was characterized as fairly open with developed terraces, a substrate dominated by cobbles and boulders and a moderately steep gradient (6.0 - 10.0%).

Vegetation along the channel consisted of upland species with some walnut. Emory oak (10.0 - 25.0 cm DBH) dominated understory tree level with Juniperus sp. of the same size were co-dominant. Walnut (10.0 - 20.0 cm DBH) existed as widely scattered individuals.

Terrace vegetation along reach 1 was dominated by sycamore (> 40 cm DBH) in the upper canopy. The understory tree level was dominated by Emory oak (10.0 - 25.0 cm DBH).

In reach 2 the canyon narrowed, there was no terrace development, substrate was dominated by large boulders and bedrock, and the gradient increased slightly (> 10.0%).

Although the riparian vegetation community was again not well developed, upland trees were absent. Water table may have been higher in this reach since there were scattered boxelder, Arizona walnut and ash (10.0 - 15.0 cm DBH). Young saplings (3.0 - 5.0 cm DBH) of these species were also present.

Reach 3 canyon remained narrow, gradient steepened, and substrate was dominated by large boulders and bedrock. In this reach scouring from high flows had removed all vegetation.

Reach 4 canyon widened, gradient remained steep, substrate dominated by large boulders, and terraces were well developed. Vegetation along stream consisted of an occasional ponderosa pine (15.0 - 30.0 cm DBH). On terraces ponderosa pine (15.0 - 30.0 cm DBH) dominated. Juniper (10.0 - 25.0 cm DBH) was the principle understory tree species.

Cattle probably range from Blue River to the beginning of reach 2. Cattle damage consisted of trailing/trampling on terrace. Use was probably moderate as most grasses still had seedheads. It was obvious that this canyon had a major flood in the last 10 years.

Fish--The river was dry throughout the surveyed reaches, therefore, no fish were observed.

Squaw Creek [611.073041, Dutch Blue Quad, T1N,R29E and Rose Peak Quad, T1N,R30E. Elevation (ft): 5400 - 5600]

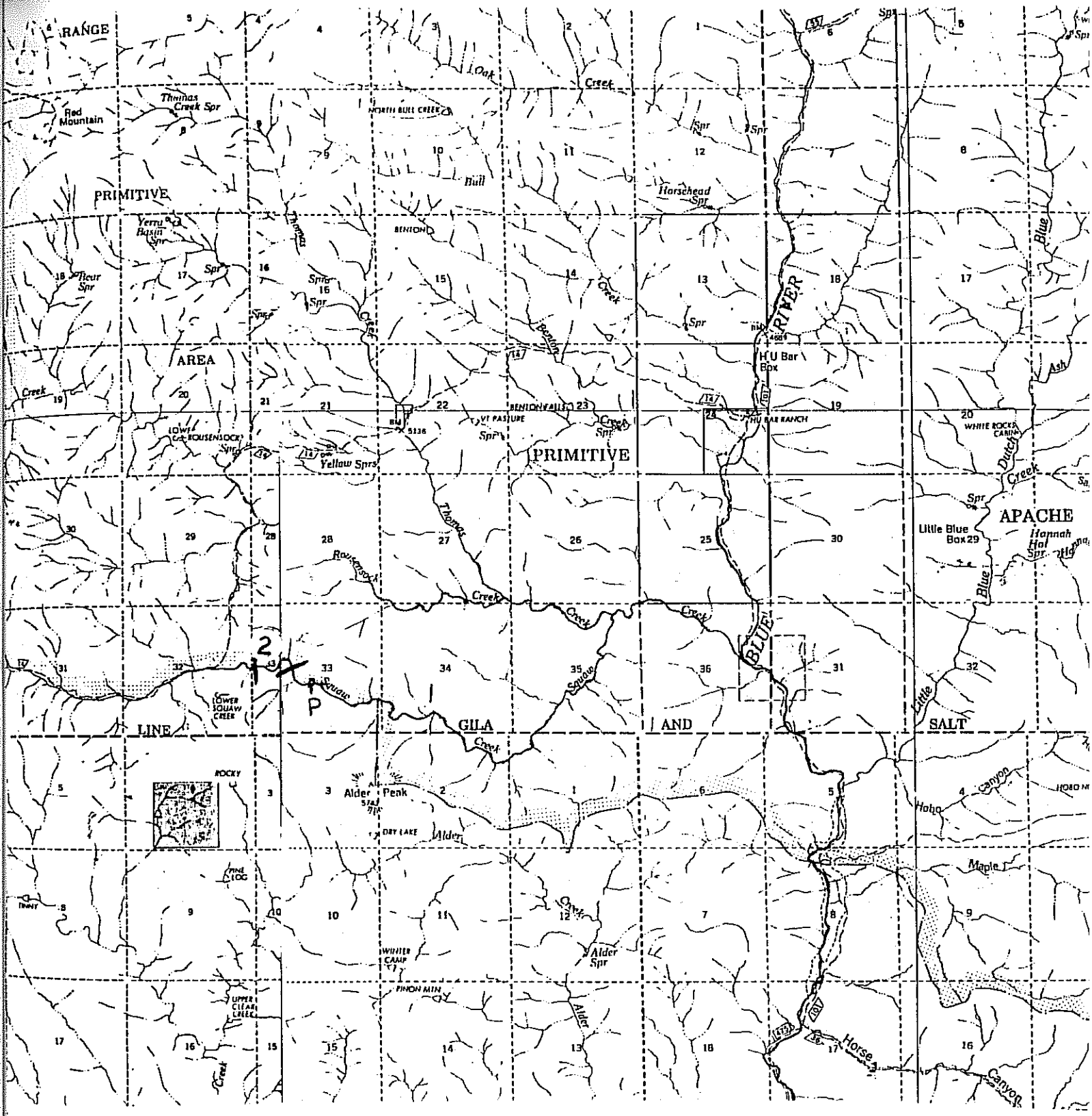
Squaw Creek was surveyed from where FS trail 14 meets the Creek downstream 6.8 km (Fig. 11). It was divided into 5 distinct reaches beginning downstream and continuing up. Only the first 1.2 km, or first two reaches, are on the Sandrock allotment and discussed here; reaches 3 - 5 are on the A D Bar allotment.

Riparian--The lower most reach (reach 1) consisted of a gentle gradient through a fairly constricted canyon with narrow terrace development. Substrate was dominated by gravel or cobble bars between bedrock outcroppings. Flow was perennial.

Channel vegetation in reach 1 consisted of an overstory dominated by widely scattered mature individuals of narrowleaf cottonwood (50.0 - 90.0 cm DBH). Reproduction was present but limited, with primarily saplings. Tree understory was identified by mature boxelder (10.0 - 20.0 cm DBH). Only isolated widely scattered box elder seedlings were observed. Downcutting had exposed roots along terrace banks.

Terraces were dominated by Gambel's oak (10.0 - 20.0 cm DBH) co-dominant with alligator juniper (Juniperus deppeana; 10.0 - 20.0 cm DBH) and one-seed juniper (Juniperus monosperma; 25.0 - 50.0 cm DBH) junipers. Reproduction consisted of alligator juniper seedlings (0.5 - 2.0 m). The shrub layer was represented by adult scarlet sumac (Rhus glabra), birchleaf buckthorn and squawbush (Rhus trilobata). Reproduction in shrubs was limited to an occasional sumac.

In reach 2 the canyon narrowed further, terraces disappeared, gradient steepened, substrate was dominated by bedrock, and flow continued as perennial.



11. Map of Squaw Creek, reaches 1 and 2 on the Sandrock allotment.

Streamside vegetation was dominated by arroyo willow. Willow reproduction was evident. An occasional mature narrowleaf cottonwood (30.0 - 60.0 cm DBH) or boxelder (10.0 - 20.0 cm) could be found in pockets at the canyon wall-floodplain margin.

Cattle damage in reach 1 consisted of terrace surfaces that had been severely trailed. Shrub diversity and reproduction was low. Alfalfa and other palatable forbs and grasses lacked seedheads and had been severely cut back by grazing. Juniper seedlings broken by cattle showed signs of lateral growth. Although narrow, reach 2 was accessible to cattle as evidenced by trailing. Willow showed some sign of grazing and alfalfa and palatable grasses had been grazed profusely.

Fish--No fish were taken. No aquatic habitat information recorded.

Unnamed Allotment

Blue River [611.073, Dutch Blue Quad, T2NR30ES26. Elevation (ft): 5000]

Historical Data.

The Blue River was sampled 21 July 1987 by U.S. Fish and Wildlife Service (USFWS) and AGFD biologists 0.8 km downstream of Raspberry Creek at the boundary of FS Primitive Area.

Riparian--Banks were mostly bare although sparse Baccharis sp. was noted in some areas.

Fish--The area of the main channel sampled consisted of 50% pool and 50% riffle habitat with a principally cobble/gravel substrate. Six native species, including loach minnow (Tiaroga cobitis) and a recaptured, re-introduced razorback sucker (Xyrauchen texanus) were taken (Table 10). One exotic, rainbow trout (Salmo gairdneri) was captured.

Table 10. Historical collections of fish from the Blue River on Unnamed Allotment at boundary of FS Primitive Area, 21 July 1987.

Species	Number of fish captured
Agosia chrysogaster	4
Catostomus insignis	66
Pantosteus clarki	215
Rhinichthys osculus	128
Tiaroga cobitis	35
Xyrauchen texanus	1
Salmo gairdneri	30

Raspberry Creek [611.07308, Blue Quad, T2NR30E. Elevation (ft): 5040 - 5600]

Historical Data.

Silvey and Thompson (1978) sampled 3 locations on Raspberry Creek in May and June, 1976. They indicate that at the time of their survey perennial flow was restricted to three reaches or a total of 4.27 km.

Fish--Moderate pool habitat was found in the upper perennial reach, while riffle/run habitat was typical in the lower reaches. Three native species, speckled dace (Rhinichthys osculus), longfin dace (Agosia chrysogaster), and Gila mountain-sucker (Pantosteus clarki) comprised the fish fauna of Raspberry Creek (Table 11). Speckled dace was most widely distributed and abundant and Gila mountain sucker was least common.

Table 11. Historical fish collections from Raspberry Creek (Silvey & Thompson 1978). Standard length (SL mm) in parentheses.

Species	Station I	Station II	Station III
Agosia chrysogaster	--[1]	1 (41.0)	--
Pantosteus clarki	--	3 (41.0 - 49.0)	--
Rhinichthys osculus	6 (39.0 - 54.0)	21 (42.0 - 59.0)	39 (30.0 - 64.0)

[1]Species observed, but not collected.

Table 12. Historical fish collections from Strayhorse Creek (Silvey & Thompson 1978). Standard Length (SL mm) in parentheses.

Species	Station I	Station II	Station III	Station IV
Agosia chrysogaster	11* (47.0 - 58.0)	9* (49.0 - 65.0)	12 (12.0 - 60.0)	10 (12.0 - 61.0)
Pantosteus clarki	--	--	5 (22,0 - 109.0)	3 (97.0 - 120.0)
Rhinichthys osculus	6* (47.0 - 54.0)	--	1 (17.0)	12 (48.0 - 60.0)
Salmo gairdneri	--	--	--	3 (164.0 - 178.0)

*Specimens returned live to station and total length measured (mm).

Table 13. Historical fish collections from the Blue River on the Wild Bunch allotment.

Species	Number of fish collected: Anderson & Turner (1977)	Montgomery (1985)	Douglas et al. (1988)
Native species			
Agosia chrysogaster	273	920	323
Catostomus insignis	42	969	102
Pantosteus clarki	27	307	142
Rhinichthys osculus	35	927	442
Tiaroga cobitis	12	345	252
Catostomidae			2256
Non-native species			
Ictalurus punctatus	2	17	--
Notropis lutrensis	--	1	4
undetermined	--	--	12

EAGLE CREEK DRAINAGE

Strayhorse Creek [611.07307, Dutch Blue Quad, T2NR30E. Elevation (ft): 4920 - 5280]

Historical Data.

Silvey and Thompson (1978) surveyed Strayhorse Creek during May and June 1976. They considered perennial flow to be confined to three discrete reaches totaling 1.38 km.

Fish--Habitat in perennial reaches was dominated by run and riffle type. Four native and one exotic species were taken from Strayhorse Creek (Table 12). In decreasing order of abundance these were: longfin dace (Agosia chrysogaster), speckled dace (Rhinichthys osculus), Gila mountain sucker Pantosteus clarki and rainbow trout (Salmo gairdneri).

Wild Bunch Allotment

Blue River [611.073, Fritz Canyon Quad, T2S,R31E. Elevation (ft): 4080]

Historical Data.

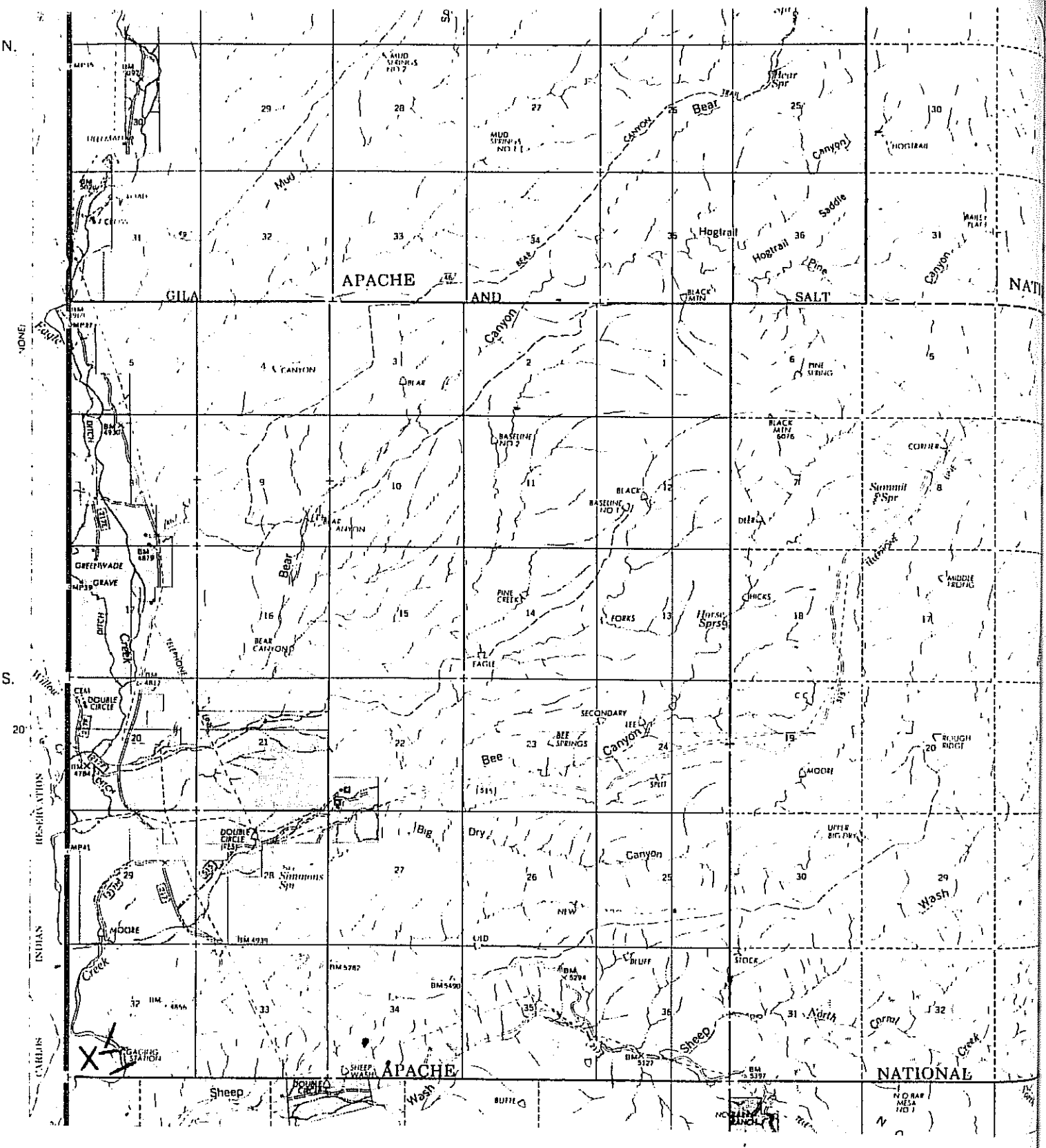
In a stream survey for New Mexico Department of Game and Fish Anderson and Turner (1977) collected 5 species of native fish, including Tiaroga cobitis, from the mouth of the Blue River to approximately 3.5 km upstream (Table 13). During July 1983 and June 1984 SWCA, Inc. collected the same species from the Blue River between FS road 475 and the San Francisco River. These data were included as part of a study on the wildlife and fishery of the upper Gila River (Montgomery 1985). Douglas et al. (1988) also report collecting in this area during June 1987.

Bee Springs Allotment

Eagle Creek [611.25, Bee Canyon Quad, T1S,R28E,S20. Elevation (ft): 4800]

Historical Data.

Propst et al. (1985) in a survey for the USFWS collected longfin dace (Agosia chrysogaster), speckled dace (Rhinichthys osculus), and Gila mountain-sucker (Pantosteus clarki) at this site on Eagle Creek 22 May 1985.



12. Map of Eagle Creek on Big Dry allotment.

Table 14. Total number, relative abundance (%), mean CPUE, total length (mm) and weight (gr) for species captured in a backwater and the main channel of Eagle Creek on the Big Dry allotment 12 January and 25 June 1988.

Species	Total number	Relative abundance	CPUE±Se (n) (range)	TL±Se (n) (range)	WT±Se (n) (range)
12 January - Main channel					
Agosia chrysogaster	2	18	0.5±0.4 (4) (0 -2)	-----	-----
Catostomus insignis	7	64	0.2±0.2 (4) (0 - 1)	-----	-----
Rhinichthys osculus	2	18	0.8±0.6 (4) (0 - 3)	-----	-----
12 January - Backwater					
Agosia chrysogaster	122	86	29.0±26.0 (6) (0 - 172)	-----	-----
Catostomus insignis	17	12	3.0±0.8 (6) (0 - 5)	-----	-----
Pimephales promelas[1]	1	1	0.2±0.2 (6) (0 - 1)	-----	-----
Xyrauchen texanus[2]	1	1	0.2±0.2 (6) (0 - 1)	342.0	459.0
25 June - Main channel					
Agosia chrysogaster	12	36	-----	33.0±2.0 (12) (26.0 - 45.0)	<1.0 (12) (≤1.0)
Catostomus insignis (8)	8	24	-----	360.0±30.0 (8) (145.0 - 432.0)	579.0±89.0 (36.0-940.0)
Pantosteus clarki	1	4	-----	233 (1)	152 (1)
Rhinichthys osculus	12	36	-----	52.0±3.0 (12) (33.0 - 71.0)	1.0±0.2 (12) (<1.0 - 2.0)
25 June - Backwater					
Agosia chrysogaster	11	34	-----	41.0±2.0 (11) (35.0 - 59.0)	<1.0
Catostomus insignis	15	47	-----	159.0±42.0 (15) (32.0 - 445.0)	235.0±97.0 (15) (<1.0 - 982)
Pantosteus clarki	6	19	-----	39.0±2.0 (6) (35.0 - 47.0)	<1

Table 15. Historical fish collections from Eagle Creek on the Big Dry Allotment.

Species	Number of fish collected				
	May 1950 (UMMZ unpubl.)	May 1985 (Propst 1985)	May 1985 (Bestgen 1985)	Jun 1987 (AGFD)	Sep 1987 (AGFD)
Native species					
Agosia chrysogaster	89	n/a	150	8	n/a
Catostomus sp.	n/a	n/a	n/a	8	n/a
Catostomus insignis	137	13	2203	6	n/a
Gila robusta	64	18	n/a	13	n/a
Gila intermedia	8	n/a	n/a	n/a	n/a
G. robusta x G. intermedia	7	n/a	n/a	n/a	n/a
Pantosteus clarki	138	15	478	1	n/a
Rhinichthys osculus	180	n/a	121	n/a	n/a
Tiaroga cobitis	12	n/a	n/a	n/a	n/a
Xyrauchen texanus[1]	n/a	n/a	n/a	n/a	4
Non-native species					
Pimephales promelas		n/a	n/a	5	n/a

[1]Recaptured from experimental stockings.

Big Dry Allotment

Eagle Creek [611.25, Bee Canyon Quad, T1S,R28E,S32. Elevation (ft): 4680]

The backwater and main channel at the gaging station near Hidden Tank Wash were sampled 12 January and 25 June (Fig. 12, Table 14). An adult razorback sucker (Xyrauchen texanus) was recaptured, from prior experimental stockings, in the backwater at this site.

Historical Data.

Recorded in the fish collection at the University of Michigan Museum of Zoology (UMMZ unpubl., Table 15) from samples taken near the gaging station at Hidden Tank Wash May 1950 are specimens of loach minnow (Tiaroga cobitis) and Gila chub (Gila intermedia). This area was again sampled 22-23 May 1985 (Bestgen 1985, Propst 1985) and 14 July 1987. AGFD records also include 4 recaptures of razorback sucker (Xyrauchen texanus) 200 m downstream of the gaging station 22-23 September 1987.

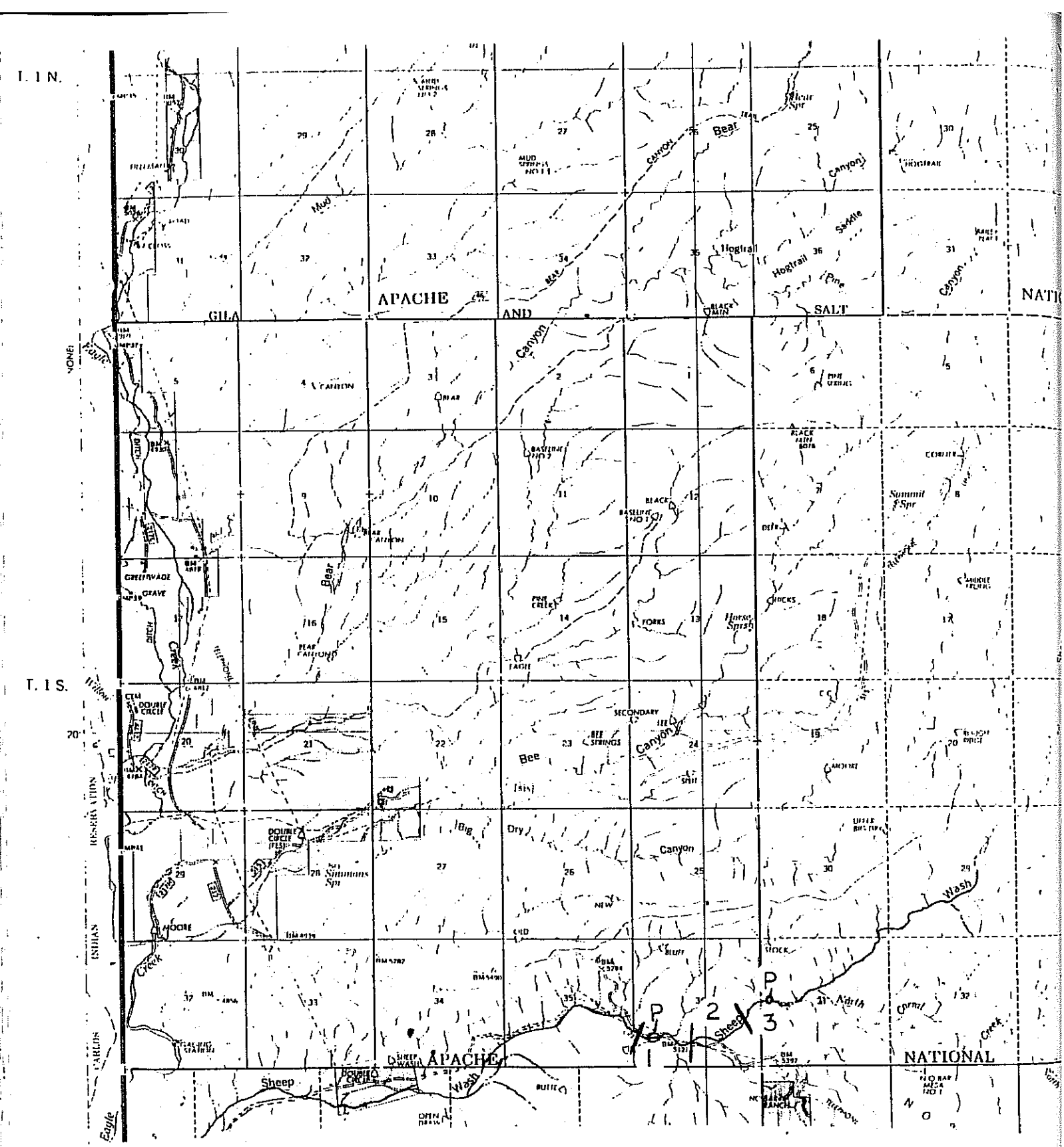
Sheep Wash [611.25, Bee Canyon Quad, T1S,R28-29E,S36. Elevation (ft): 5120 - 5240]

Sheep Wash was surveyed 15 January and 3 February from the bridge on FS road 217 upstream 2.4 km to the confluence with N. Corral Creek (Fig. 13). This section was divided into 3 reaches beginning at the bridge.

Riparian--Canyon was wide in reach 1. Gradient was low and substrate consisted of a variety of particle sizes dominated by boulders. Terrace was very wide and cut by a side channel. It appeared that the side channel meanders from the presence of rip-rap between the road and side channel. Although flow was mostly ephemeral, alder growth indicated water table occurring just subsurface.

Canopy at streamside was fairly open with overstory dominated by widely spaced sycamore (> 50.0 cm DBH) and co-dominated by Fremont's cottonwood (30.0 - 50.0 cm DBH). Young alder (3.0 - 10.0 cm DBH) growing in dense continuous stands dominated understory tree level. Alder reproduction vigorous but less so for cottonwood and sycamore. Shrub level dominated by shrub-sized alder saplings.

Terrace vegetation consisted of sycamore (> 50.0 cm DBH) in the upper canopy and ash (3.0 - 10.0 cm DBH) in the understory tree level. Shrub level was totally lacking. Scattered and infrequent dried remnants of herbaceous ground cover were observed.



13. Map of Sheep Wash, reaches 1 - 3 on the Big Dry allotment.

In reach 2 canyon remained wide with gradient shallow. Terrace development was good. Substrate consisted of a variety of particle sizes dominated by boulders.

Upper canopy at streamside and on terrace was dominated by sycamore (> 50.0 cm DBH).

Reach 3 was similar in canyon characteristics to reach 2. In contrast, flow was perennial and canopy more closed.

Upper canopy along the stream was dominated by alder (> 20.0 cm DBH) in dense continuous mature stands with sycamore (> 50.0 cm DBH) the co-dominant. Alder (< 15.0 cm DBH) also dominated understory tree level. No shrub midstory noted. Alder seedlings grew in small, widely spaced clumps.

Terrace vegetation dominated by sycamore (> 50.0 cm DBH) in the upper canopy, ash (10.0 - 20.0 cm DBH) dominated understory tree level. No shrub midstory present.

Grazing pressure appeared fairly intense through this section of Sheep Wash. Along the channel alder seedlings in particular showed signs of lateral growth. Large, bare areas of soil existed on terraces with grasses reduced to scattered tufts. Shrubs and shrub-sized trees were either absent or old and broken. It is possible, however, that shrubs had been removed by scouring of floods.

Fish--No fish were taken. Stream was approx. 3.0 wide and 0.2 m deep. Riffle and pool habitat was most common along with a few backwater areas. Cobbles dominated substrate. Cladophora sp. dominated the aquatic vegetation present. Nasturtium sp. also occurred. The water temperature was a consistent 7° C.

Dark Canyon Allotment

Dark Canyon [611.25, Clifton Quad, T3S,R28E. Elevation (ft): 4720 - 5120]

Dark Canyon was surveyed 29-30 June from its mouth 2.5 km upstream (Fig. 14). Two reaches were described.

Riparian--Basic characteristics were shared by both reaches. These were a narrow canyon with narrow, but well developed terraces, dense upper canopy, moderately steep grade and a substrate consisting of a variety of particle sizes but dominated by boulder and in places bedrock. Fallen trees alder and cypress were common.

Reach 1 extended from mouth of Dark Canyon to vicinity of springs on terrace (stream left). Flow was perennial.

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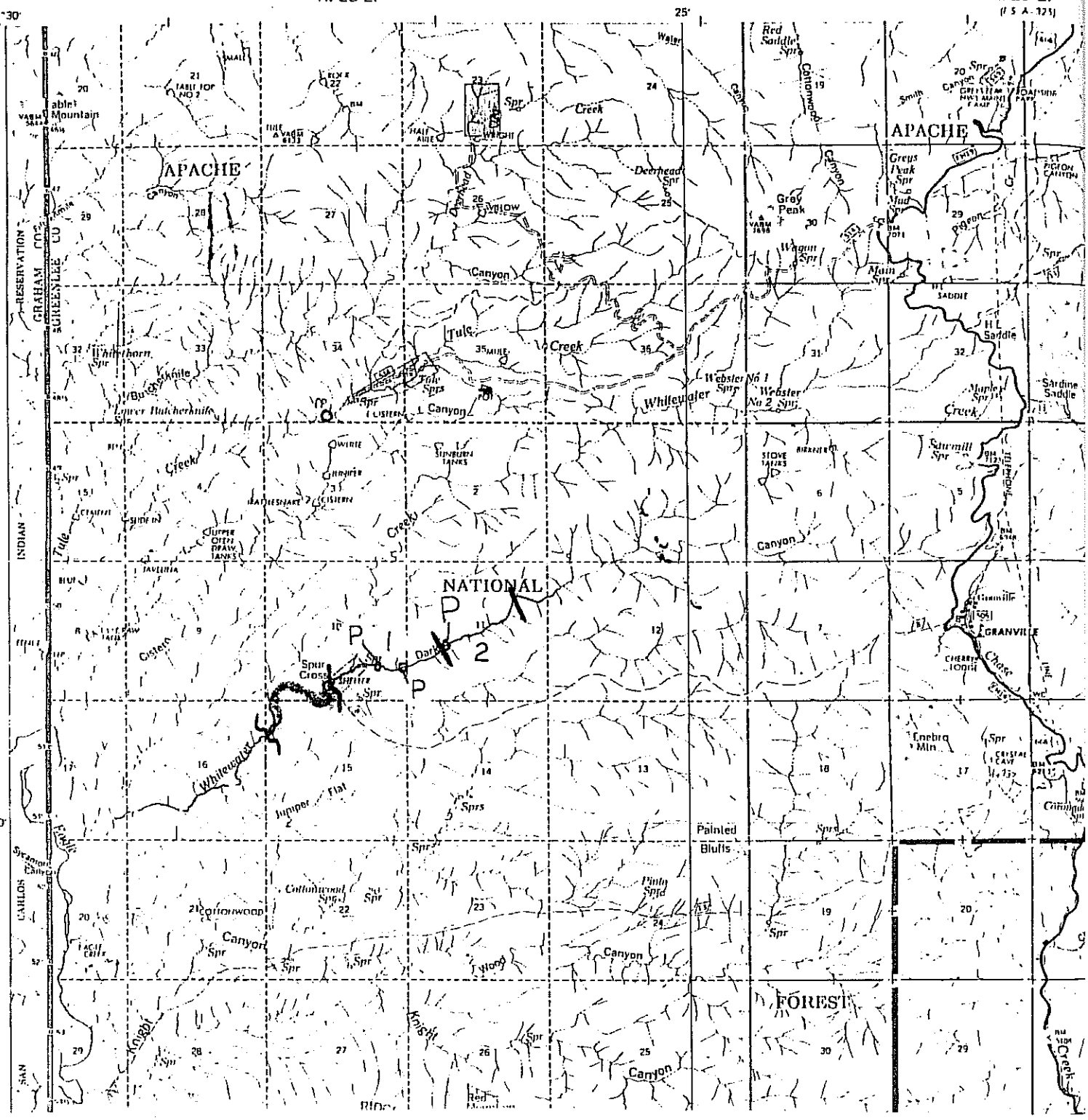


14. Map of Dark Canyon, reaches 1 and 2 and Whitewater Creek on Dark Canyon allotment.

Two different riparian strands were characteristic of reach 1. The first type had dense even-aged stands of alder (15.0 - 20.0 cm DBH) along the stream. Understory tree level was dominated by Arizona cypress (5.0 - 10.0 cm DBH) growing as scattered individuals. Low light conditions limited recruitment of riparian tree species. Terraces were cut 1.0 - 2.0 m above channel. Terraces were narrow with upper canopy dominated by sycamore (> 60.0 cm DBH). Walnut (20.0 - 30.0 cm DBH) dominated the understory tree level. Shrubs were absent from terraces, but were found on adjacent canyon walls in dense stands dominated by Condalia sp..

The second riparian type was an area characterized by a greater mix of alder age-classes as well as species within the canopy. Along the stream the upper canopy was dominated by alder (> 45.0 cm DBH) with sycamore (> 60.0 cm DBH) co-dominant. Ash (15.0 - 25.0 cm DBH), also present in the upper canopy, dominated the understory tree level. In open areas where senescent trees had fallen, alder seedlings and saplings grew. Terraces were also covered by dense canopy. Sycamore (> 60.0 cm DBH) dominated the upper layer, while ash and walnut (both 20.0 - 30.0 cm DBH) dominated the understory level. Shrub midstory consisted of widely scattered scarlet sumac monocultures.

Reach 2 extended above springs where water was moving subsurface and flow was ephemeral. The canopy both streamside and on terrace was more open.

Upper canopy streamside was dominated by Arizona cypress (> 70.0 cm DBH) co-dominant with sycamore (> 60.0 cm DBH). The understory tree level was dominated by ash (25.0 - 35.0 cm DBH). Shrub-sized cypress saplings comprised the shrub midstory.

The upper canopy on terraces was dominated by sycamore (> 60.0 cm DBH) with alligator juniper (> 45.0 cm DBH). Cypress (> 60.0 cm DBH) was also present. Netleaf hackberry (20.0 - 30.0 cm DBH) dominated the understory tree. Shrub midstory was depauperate consisting of scattered individuals of Brickellia sp. Reproduction was restricted to scattered dense patches of hackberry seedlings.

The terraces were heavily trailed. Saplings showed signs of lateral growth from either grazing or breakage. What remained of grasses had been grazed down to basal meristem. Large exposed soil surfaces were common.
Fish--No fish were taken. Creek was approx. 1.0 m wide and 0.05 - 0.1 m deep. Habitat consisted mainly of pools and runs, many with snags. Cobbles, boulders, roots, leaves and gravel describe the substrate.

Table 16. Historical fish collections from Eagle Creek on the Dark Canyon Allotment.

Species	Distance downstream of Sycamore Canyon 1.6 km	3.2 km
Native species		
Agosia chrysogaster	5	5
Catostomus sp.	--	2
Catostomus insignis	32	32
Gila robusta	24	4
Meda fulgida	29	35
Pantosteus clarki	4	9
Non-native species		
Ameiurus natalis	--	4
Ictalurus punctatus	1	--

Eagle Creek [611.25, Clifton Quad, T3S,R28E,S29 and S32. Elevation (ft): 4000]

Historical Data.

Eagle Creek was sampled at two locations on the Dark Canyon Allotment by AGFD and Arizona State University (ASU) personnel 16-17 July 1987. The first was 1.6 km downstream of Sycamore Canyon and the second was 3.2 km downstream.

Riparian--Bank vegetation at the first site consisted of cottonwood, willow and Baccharis salicifolia. Mesquite (Prosopis sp.) hung over the bank at the second site.

Fish--The most common fish habitat was a run over a cobble substrate. At the second site a connected backwater with a gravel-sand bottom was sampled. Spikedace (Meda fulgida) was collected at both locations (Table 16).

Whitewater Creek [611.25, Clifton Quad, T3S,R28E. Elevation (ft): 4480 - 4720]

Whitewater Creek was surveyed from the confluence with Dark Canyon downstream 2.0 km (Fig. 14).

Riparian-- This stretch was perennial, with well developed terraces and dense closed canopy. Substrate consisted of a variety of particle sizes but was dominated by large boulders and bedrock. Upper canopy along the stream was dominated by alder (> 30 cm DBH). Co-dominants in upper canopy were sycamore (> 60 cm DBH) and Arizona cypress (Cupressus arizonica; > 75 cm DBH). Understory tree layer was dominated by alder (15.0 - 25.0 cm DBH) and ash (25.0 - 35.0 cm DBH). Forest consisted primarily of older trees with reproduction occurring mainly in gaps in the canopy where large trees had fallen.

Terraces rose 0.5 - 1.0 m above channel floor. Upper canopy was dominated by sycamore (> 60.0 cm DBH) with ash (30.0 - 40.0 cm DBH) co-dominant. Understory tree level was dominated by walnut (15.0 - 20.0 cm DBH) and alligator juniper (25.0 - 35.0 cm DBH). Scarlet sumac growing in scattered but dense thickets dominated shrub midstory. Understory was discontinuous consisting of scattered stretches of grasses and dense stands of sumac.

At the upper end of this stretch terraces had recently been heavily utilized by cattle. Heavy trailing and shrub breakage were evident. Scattered areas of grasses were separated by bare, exposed soil. Downstream the canyon narrowed and cattle use appeared reduced.

Fish-- No fish were taken. Aquatic habitat in upper end of this stretch of Whitewater Creek was similar to that in Dark Canyon. However, at the lower end there were many waterfalls which may have served as barriers to upstream movement by fish. Nostoc sp. occurred as a small percentage of the aquatic vegetation cover. The water temperature was a consistent 22° C.

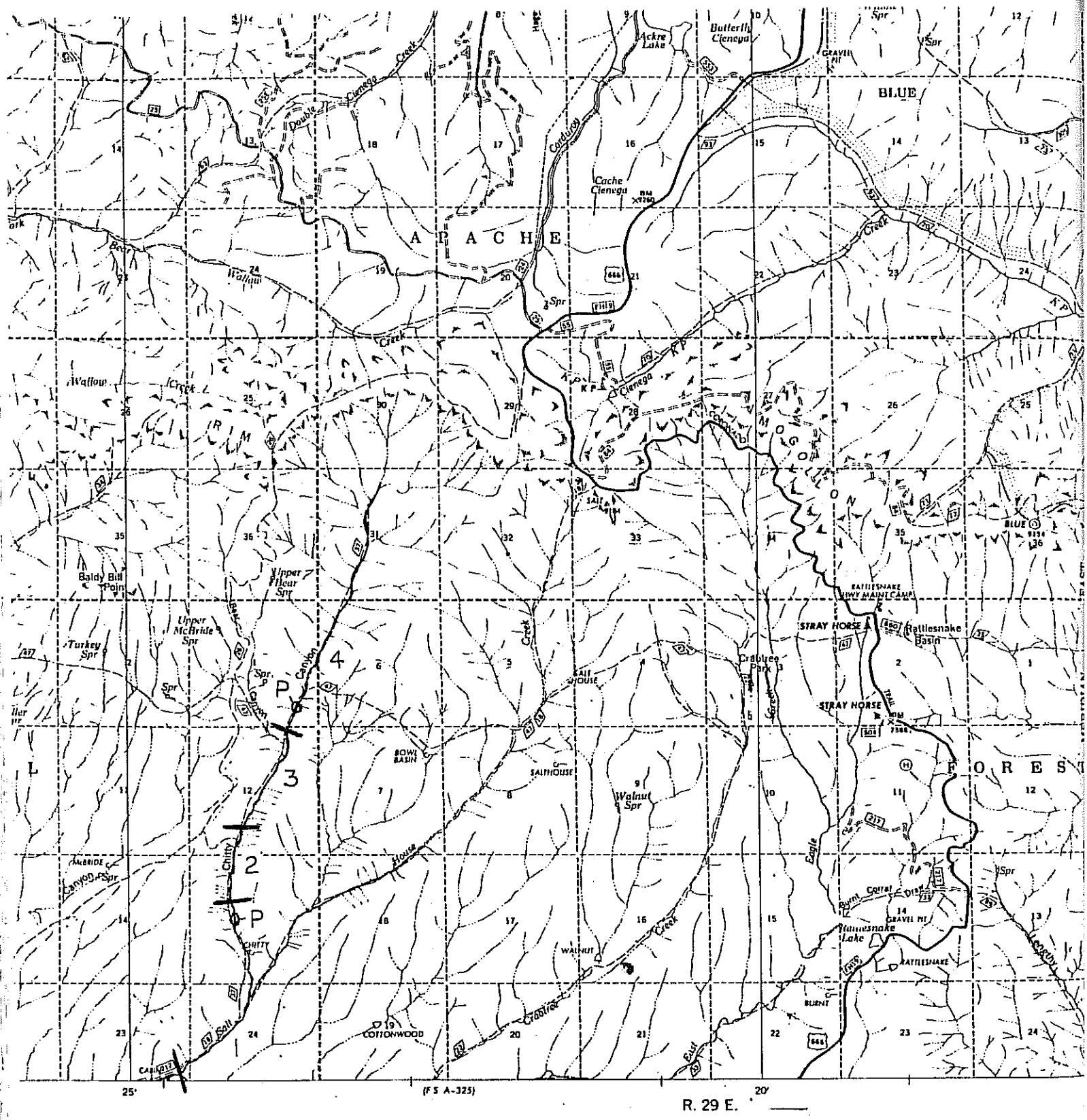
East Eagle Allotment

Chitty Creek [611.2551, Hannagan Meadow Quad, T3N,R28E. Elevation (ft): 6200 - 6900]

Chitty Creek was surveyed 24 June from its confluence with Salt House Creek upstream to just above the falls (Fig. 15). Four reaches were described.

Riparian--Reach 1 included lower Salt House Canyon and Chitty Canyon up to Forest Service exclosure gate. Canyons were wide with well developed terraces. Substrate was dominated by boulders and flow was mostly ephemeral.

Channel vegetation overstory was dominated by widely spaced large narrowleaf cottonwood (> 80.0 cm DBH). walnut (10.0 - 25.0 cm DBH) dominated tree understory. Reproduction was severely limited.



15. Map of Chitty Creek, reaches 1 - 4 on the East Eagle allotment.

Terraces were dominated by ponderosa pine and walnut (10.0 - 15.0 cm DBH) in overstory and understory respectively. Monocultures of scarlet sumac grew as widely spaced stands of one or two individuals in shrub understory. Young juniper were co-dominant in shrub layer. An herbaceous layer of grasses and forbs was completely nonexistent. Reproduction was all but absent. Banks showed signs of massive cutting with exposed tree roots and fallen trees common. Siltation in the stream was noted.

Reach 2 occurred mostly inside the exclosure. Gradient in this reach was shallow. Terraces were well developed, often relatively wide with large specimens of all species. Substrate consisted of a variety of particle sizes and flow was perennial.

Alder (some > 65.0 cm DBH) was the dominant overstory species along creek co-dominant with narrowleaf cottonwood (> 80.0 cm DBH). Tree understory consisted of boxelder (some > 30.0 cm DBH). A fairly thin shrub layer was comprised of scattered individual birchleaf buckthorn (< 2.0 m). All size classes of alder existed. Cottonwood and boxelder seedlings were scattered.

Terrace vegetation was dominated by ponderosa pine and narrowleaf cottonwood (> 80.0 cm DBH). Understory was dominated by boxelder (> 30.0 cm DBH) with co-dominant walnut (15.0 - 25.0 cm DBH). Shrub midstory dominated by dense birchleaf buckthorn . Seedlings and saplings were present for all trees.

There were distinct differences between the area exclosed to cattle and the grazed area below the exclosure. On the terrace within the exclosure a healthy shrub midstory with herbaceous understory existed. Tree reproduction was evident. A thick layer of leaf litter covered the ground. Bank morphology also appeared less conducive to erosion and loss of large trees.

The canyon narrowed in reach 3 with subsequent reduction or loss of terraces. Substrate was composed of a variety of particle sizes but bedrock and boulder dominated. Flow remained perennial.

Tree overstory along channel dominated by alder (> 60.0 cm DBH). Boxelder (> 30.0 cm DBH) identified the understory. Reproduction was fairly good. Alder seedlings and saplings were found in discontinuous, small dense clumps along with scattered boxelder seedlings and shrub-sized saplings.

Tree overstory on terraces was dominated by boxelder (20.0 - 30.0 cm DBH) and Gambel's oak (15.0 - 25.0 cm DBH) with walnut in tree understory. Shrub midstory dominated by buckthorn (0.5 - 2.0 m) and young Gambel's oak. Herbaceous understory cover 35 - 50%. Reproduction present for all trees both as seedlings and saplings.

Reach 4 was located above falls. Gradient steepened, terraces widened slightly, bedrock and large boulders dominated substrate.

Tree overstory along creek was dominated by alder. Boxelder (> 40.0 cm DBH) dominated understory. Shrub layer consisted of widely separated but common individuals of birchleaf buckthorn. Reproduction evident for alder and boxelder as common but spotty seedlings and shrub-size saplings.

Terraces were only 1.0 - 1.5 m above channel. Dominant in overstory were boxelder (> 40.0 cm DBH) and ponderosa pine. walnut (> 30.0 cm DBH) was often co-dominant. Birchleaf buckthorn again dominated shrub layer. Ground cover (herbaceous plants and bracken fern) was 50% or more.

Grazing impact appeared heaviest in reach 1. Cattle trailing was strongly visible on terraces. Large bare areas devoid of cover and leaf litter were encountered. All shrubs showed signs of breaking and trampling. Young cottonwoods sprouting from seed and root showed signs of continuous grazing and regrowth. In reaches 3 and 4 terraces were grazed as evident by trails and decreased shrub growth, but use was moderate.

Fish--Trout taken above and below the falls were tentatively identified as Gila x Rainbow hybrids (Salmo gilae x Salmo gairdneri) based on morphometric and meristic counts (Nickolas 1986), zoogeography (Miller 1972, Minckley 1973, USFWS 1979) and previous genetic studies (Loudenslager et al. 1986). However, Kynard (1976) described the Chitty Creek trout as closer to Apache than Gila trout based on discriminate analysis of morphologic and meristic traits. A definitive analysis of the taxonomic status of this trout is lacking, however, Mike Childs (pers. comm., May 1989) and Dr. Thomas Dowling (Department of Zoology, Arizona State University) are presently investigating taxonomic status of the Chitty Creek trout through analysis of mitochondrial DNA.

Fish habitat in Chitty Creek consisted of pools 40-50 cm deep, with abundant large snags, boulders and cobbles providing cover. Pools were small, approximately 2.0 m^2 with 4-5 trout (100 - 150 mm TL) per pool. Small clumps of Cladophora sp. occurred in reach 2. Water temperature ranged from 14° C to 16° C.

Eagle Creek [611.25, Robinson Mesa Quad, T2N,R28E. Elevation (ft): 5480-5560]

Historical Data.

The earliest records found from Eagle Creek on the East Eagle allotment were from collections made 27 July 1934 (UMMZ unpubl., Table 17). Madsen (1935) surveyed upper Eagle Creek and reported collecting "numerous suckers and bonytails, but not trout." The "bonytails" referred to were probably Gila robusta commonly known today as roundtail chub. In their survey, Mulch and Gamble (1956)

reported a native trout from Eagle Creek which Minckley (1973) surmised could have been Gila trout (Salmo gilae) or Apache trout (Salmo apache). Miller and Lowe (1964) also indicated that a native trout inhabited Eagle Creek. Kynard (1976) sampling Eagle Creek on the East Eagle allotment 0.4 km above Four Drag Ranch and at the mouth of Dry Prong Creek documented 5 native fishes and a trout, identified as Salmo sp. probably a rainbow, perhaps a rainbow x native trout hybrid (Minckley 1973). Based on zoogeographical data, Minckley (1973) suggested that the Gila trout is the more likely of the two native trouts to have been found in the Eagle Creek drainage.

Table 17. Historical fish collections in Eagle Creek on the East Eagle Allotment.

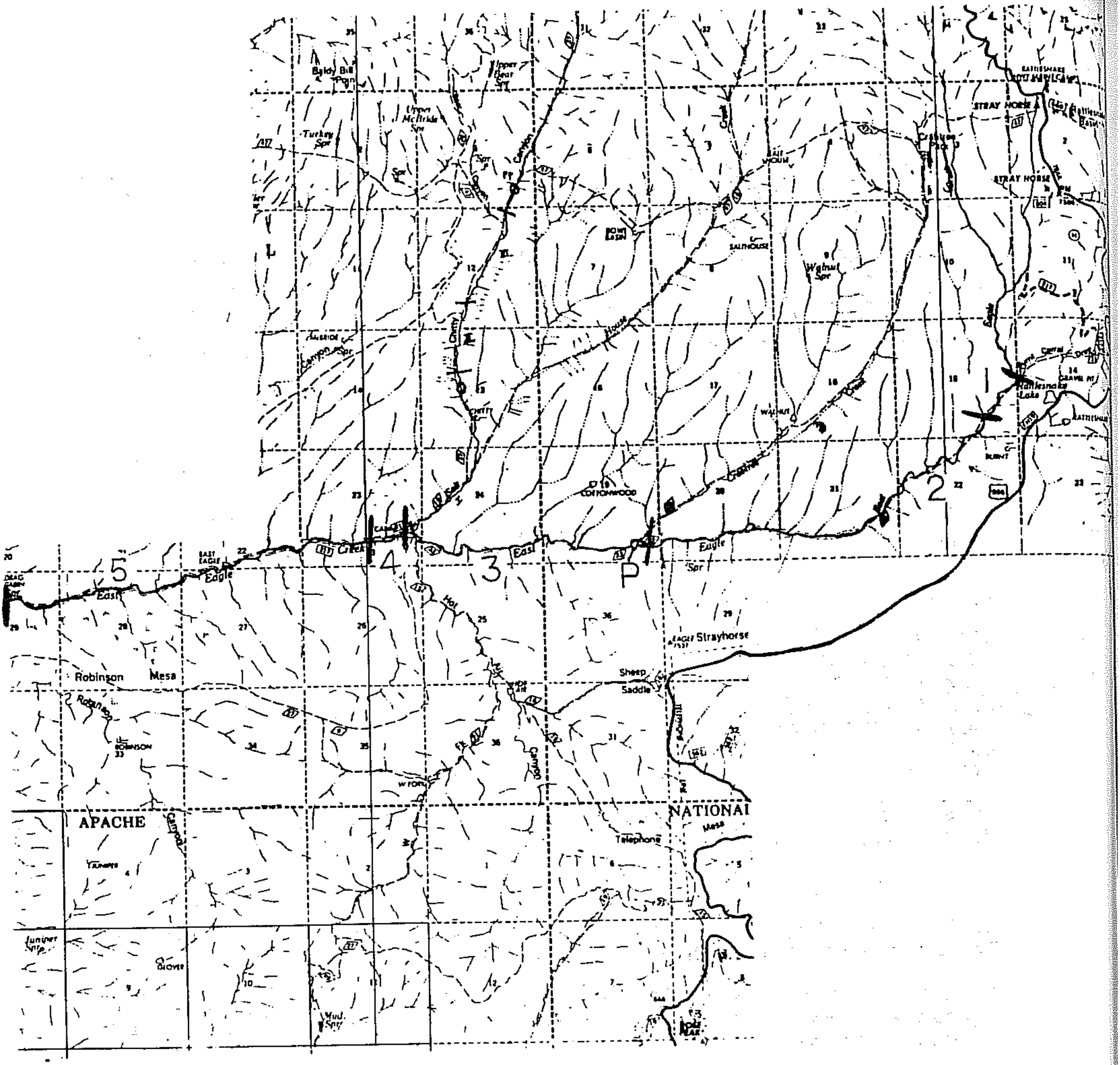
Species	Number of fish collected (UMMZ unpubl.)	(Madsen 1935)	(Kynard 1976)
Agosia chrysogaster			96
Catostomus insignis			61
Gila robusta[1]		>45	151
Pantosteus clarki	6		400
Rhinichthys osculus			236
Salmo sp.			6
Catostomidae		>75	

[1]See DeMarais (1986 unpublished) for discussion of localized distribution of chub sub-species.

East Eagle Creek [611.255, Hannagan Meadow Quad, T3N,R29E and Robinson Mesa Quad, T2N,R28-29E. Elevation (ft): 5600 - 6900]

East Eagle Creek was surveyed 23-24 June from Burnt Corral Draw downstream 15.3 km to the mainstem of Eagle Creek (Fig. 16). Five reaches were described.

Riparian--Canyon in reach 1 was broad with good terrace development and a moderately steep gradient. Substrate was dominated by boulders and flow was ephemeral. Occasional mature alder (10.0 - 15.0 cm DBH) grew along the channel but ponderosa pine dominated tree overstory. Gambel's oak was dominant in understory. Only limited reproduction noted. On terraces Southwestern white pine dominated overstory. Birchleaf buckthorn dominated shrub midstory. Herbaceous and forb cover was 35 - 40%.



16. Map of East Eagle Creek, reaches 1 - 5 on the East Eagle allotment.

Reach 2 was characterized by a narrower canyon, and steeper grade. Dominant substrate changed to bedrock but large boulders still present. Flow in this reach was perennial.The well developed riparian forest consisted of multi-aged continuous stands of alder dominating overstory. Large mature specimens (> 30.0 cm DBH) were common. Tree understory consisted of scattered boxelder (10.0 - 20.0 cm DBH). Shrub understory was well developed with arroyo willow (> 2.0 m) in dense clusters. Co-dominant with willow was birchleaf buckthorn (1.0 - 2.0 m). Reproduction for all species was prolific.

Narrow areas above stream were dominated by Gambel's oak (20.0 - 30.0 cm DBH). Young Gambel's oak and Southwestern White pine formed tree understory. Reproduction observed for all species. Young Gambel's oak were also part of the shrub layer along with birchleaf buckthorn. On talus slopes which penetrated this area, the tree understory was dominated by quaking aspen with shrub layer dominated by New Mexican locust. Willow in shrub layer was so dense in locations that it completely overhung water.

In reach 3 the canyon opened-up, gradient decreased, terraces were again well developed and cut above channel floor 1.5 - 2.0 m. Substrate now dominated by boulders and flow mostly ephemeral.

Tree overstory along channel was dominated by ponderosa pine (35.0 - 50.0 cm DBH). Widely scattered were mature boxelder and walnut (10.0 - 25.0 cm DBH). Large narrowleaf cottonwood (> 50.0 cm DBH) were occasionally encountered. Reproduction for riparian species consisted of scattered individual seedlings and saplings.

Ponderosa pine also dominated terrace vegetation. Walnut occurred in tree understory co-dominant with juniper. Shrub midstory included boxelder and birchleaf buckthorn with scarlet sumac co-dominant. Grasses, forbs and herbs were fairly well represented. Reproduction adequate mostly as boxelder seedlings, juniper, walnut and Gambel's oak saplings.

Reach 4 began just below confluence of Salt House and East Eagle Creeks to just below cabin. Canyon characteristics were the same as reach 3, but flow now perennial.

Channel vegetation was dominated by mature, large alder (> 60.0 cm DBH) forming a closed canopy. Overstory co-dominant was narrowleaf cottonwood (> 60.0 cm DBH). While the understory was dominated by boxelder (> 30.0 cm DBH). Shrub layer consisted of an occasional birchleaf buckthorn and shrub-sized cottonwood and boxelder saplings in small widely spaced clumps. Overall, reproduction appeared good for all species.

Terraces were dominated by narrowleaf cottonwood, co-dominant with ponderosa pine (both > 50 cm DBH). Understory trees composed of boxelder and walnut (20.0 - 30.0 cm DBH). Birchleaf buckthorn and

scarlet sumac were dominant, and co-dominant, respectively, in shrub midstory. Reproduction represented by multiple age classes for all species.

In reach 5 canyon opened-up further and stream channel widened. Terraces became even wider. Substrate still dominated by boulders, but flow mostly ephemeral.

Channel vegetation was dominated by narrowleaf cottonwood (> 65.0 cm DBH). Walnut or boxelder (20.0 - 30.0 cm DBH) dominated understory. Shrubs were uncommon consisting primarily of scarlet sumac. Tree species were reproducing.

Terraces were dominated by ponderosa pine. Narrowleaf cottonwood (> 65.0 cm DBH) was co-dominant. Tree understory was dominated by walnut. Shrub layer included juniper and sumac. Grasses, forbs and annuals presented 40 - 50% cover. All size classes of ponderosa pine and walnut were noted. Some downcutting was observed, as well as destruction resulting from high flows.

Burnt Corral Draw was heavily grazed. In the upland ponderosa pine forest there were large barren spaces devoid of grasses, forbs or annuals. Reach 2 was perhaps too rugged and therefore unaccessible to cattle. Undergrowth was dense and untrampled. Cattle use was moderate in reaches 3, 4 and 5. Trailing was present and shrubs showed breakage. There was evidence of lateral growth on young Gambel's oak and young narrowleaf cottonwood at trailside had obviously been grazed. Grazing pressure, although moderate, was also evident on grasses, herbs and forbs.

Fish--No fish were taken in the area sampled near the confluence of East Eagle and Crabtree Creeks. Fish were not observed throughout the entire stretch of East Eagle until a few hundred meters from the confluence of East Eagle with Dry Prong and Eagle Creeks. Water in this area is known to be permanent while East Eagle is ephemeral. Water temperature was a consistent 17° C.

Historical Data.

Only one historical record was found from East Eagle Creek (UMMZ unpubl.). March 1939 three Gila mountain-sucker (Pantosteus clarki) and three longfin dace (Agosia chrysogaster) were collected.

Mud Springs Allotment

Eagle Creek [611.25, Robinson Mesa Quad, T1N,R28E,S18 and S7]

Historical Data.

Eagle Creek was sampled 21-22 April 1985 by Propst et al. (1985) at T1N,R28E,S18 (Table 18). Eagle Creek on Mud Springs allotment was later sampled 3.2 km downstream of Honeymoon campground (T1N,R28E,S7) 14 July 1987 by AGFD and ASU personnel. In this area bank vegetation consisted of dense alder and scattered sycamore. Fish habitat in the main channel was mostly runs with a cobble substrate.

Table 18. Historical fish collections from Eagle Creek on the Mud Springs allotment.

	Numbers of fish collected	
Species	21-22 Apr 1985	14 July 1987
Agosia chrysogaster	--	7
Catostomus sp.	--	3
Catostomus insignis	6	11
Gila robusta[1]	5	2
Pantosteus clarki	1	13
Rhinichthys osculus	--	47
Salmo gairdneri	2	2

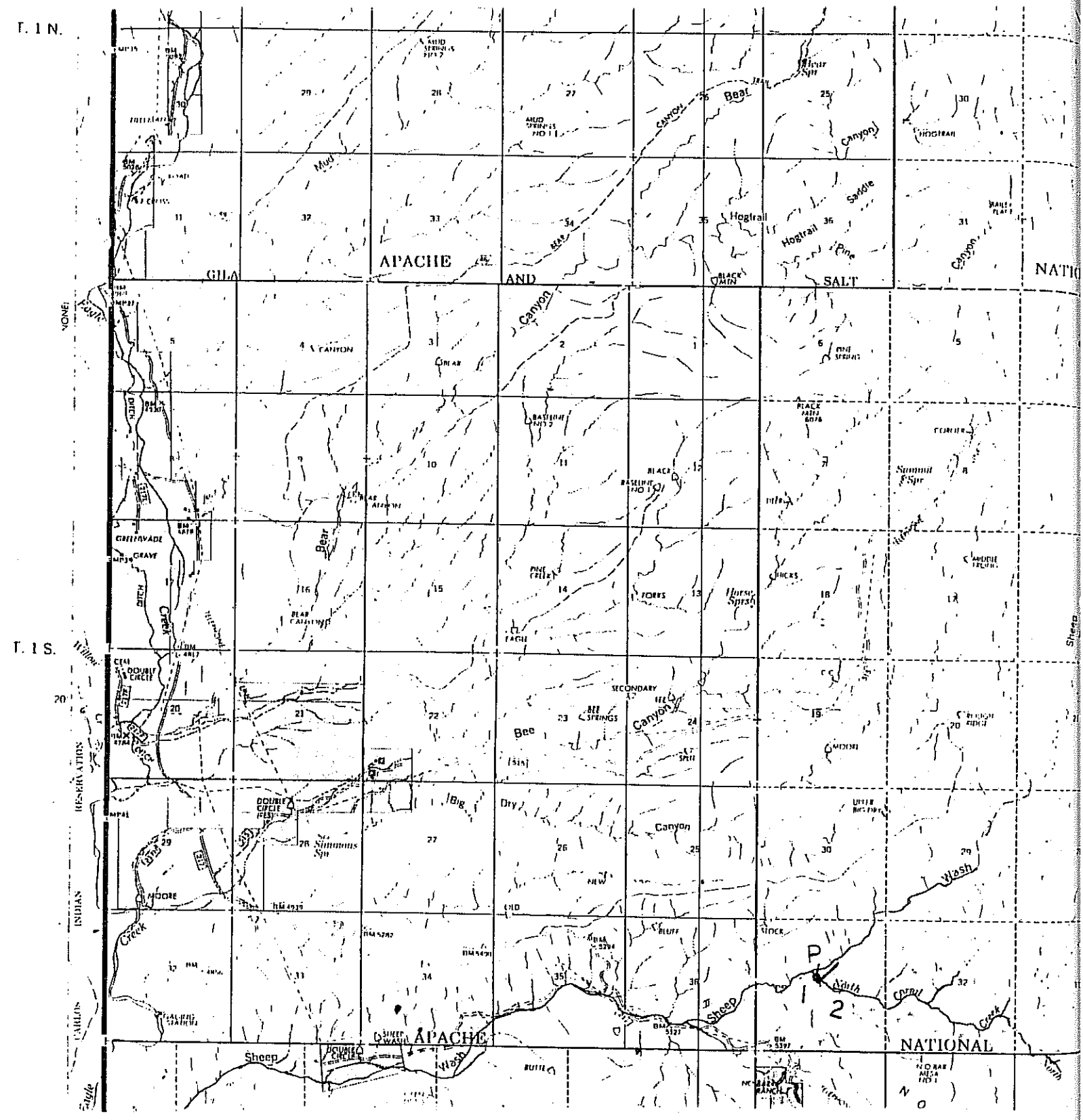
[1]See DeMarais 1986 (unpublished thesis) for discussion of localized distribution of chub sub-species.

N O Bar Allotment

N. Corral Creek [611.25, Bee Canyon Quad, T1S,R29E. Elevation ft): 5240 - 5280]

N. Corral Creek was surveyed 3 February from its confluence with Sheep Wash approximately 1.0 km upstream to constriction in canyon (Fig. 17). Two distinct reaches were described.

Riparian--Reach 1 extended from confluence to approximately 0.5 km below narrowing of canyon. Canyon was very wide, gradient steep and terraces narrow. Substrate was dominated by large boulders. Flow appeared to be ephemeral.



17. Map of North Corral Creek, reaches 1 and 2 on the N O Bar allotment.

Canopy of channel vegetation was open. Upper layer was dominated by sycamore (> 50.0 cm DBH).

Terraces had grass and light herbaceous cover.

In reach 2 the canyon narrowed, and continued to be steep. Substrate was dominated by large boulders and bits of exposed bedrock. Terraces were narrow and raised quite high above level of stream channel. Presence of large alder and exposed bedrock indicated that this reach was probably perennial. Canopy streamside was discontinuous dominated by alder (20.0 - 35.0 cm DBH). Ash (25.0 - 35.0 cm DBH) was co-dominant, with sycamore (> 50.0 cm DBH) also present. Understory tree level dominated by young alder (5.0 - 10.0 cm DBH). Shrub midstory not present. Reproduction identified by alder in sapling stage growing as scattered individuals with a few seedlings. Upland species vegetated terraces.

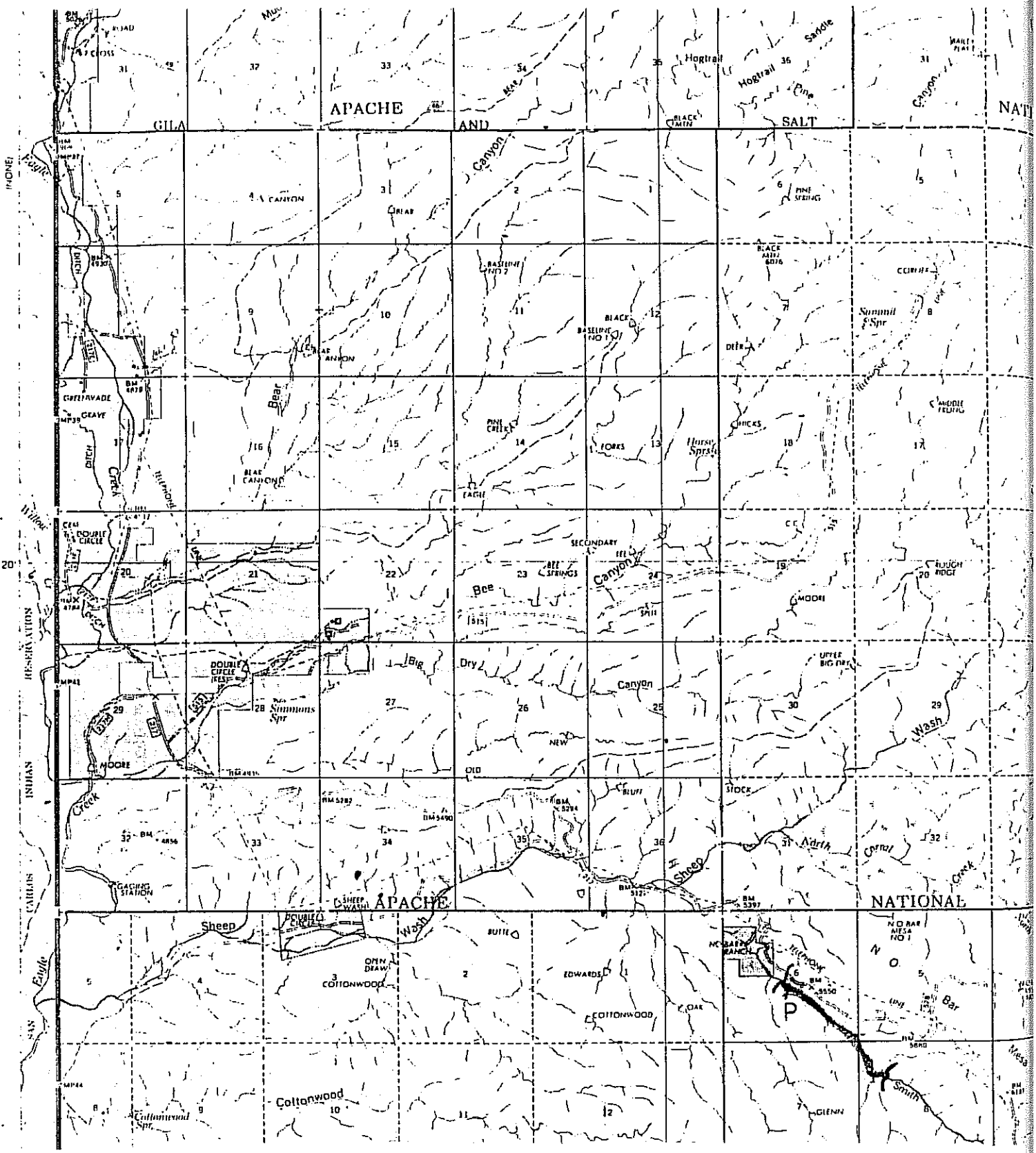
Cattle trailing was extensive with large areas of exposed soil. Shrub midstory and understory of grasses and herbaceous cover had been heavily used.

Fish--No fish were taken. Stream was very turbid carrying runoff.

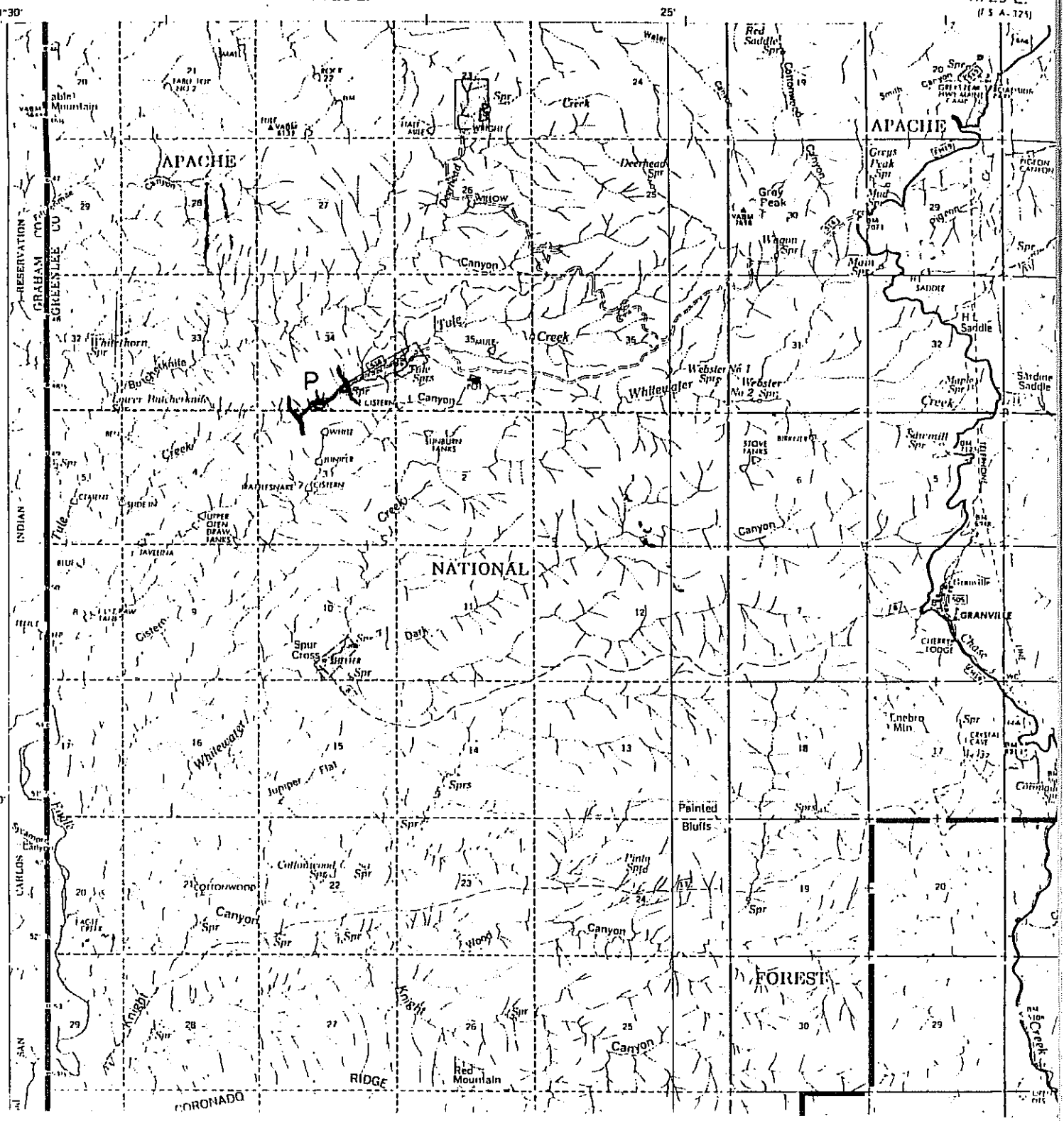
Smith Canyon [611.25, Bee Canyon Quad, T2S,R29,S6. Elevation (ft): 5360]

Smith Canyon was surveyed 16 January (Fig. 18). The area sampled began approximately 2.4 km above NO Bar ranch and continued upstream 1.5 km.

Riparian--Canyon was moderately wide, had a shallow grade and terrace development on both sides of stream. Substrate consisted of a variety of particle sizes, dominated by cobbles. Small springs were observed flowing from fractured bedrock. This fact, along with the presence of watercress and observed stream flow in June below ranch suggests that flow is perennial. Upper canopy streamside was dominated by sycamore (> 50.0 cm DBH) with a very dense and closed canopy. The understory tree level was dominated by alder (3.0 - 8.0 cm DBH). There was no shrub midstory along the stream. Reproduction was sparse consisting of small, scattered stands of alder and an occasional ash. Sycamore (> 50.0 cm DBH) also dominated upper canopy on terrace with juniper (Juniperus sp.; 5.0 - 15.0 cm DBH) the dominant understory tree. The shrub midstory was dominated by dense stands of scarlet sumac. Tree reproduction on terrace was not obvious, but was perhaps a consequence of winter conditions.



18. Map of Smith Canyon on the N O Bar allotment.



19. Map of Tule Creek on the Tule allotment.

Cattle impact at streamside appeared low except grazed areas at crossings. However, there was a great deal of leaf litter which may have covered trampled sites. On terraces, heavy trailing was visible with some areas of bare soil. The presence of such dense stands of sumac may indicate a high level of disturbance.

Fish--No were fish taken. Stream was approx. 1.5 m wide, 0.3 m deep and clear. Substrate was composed of cobble and gravel. Riffles were the predominant habitat type. Nasturtium sp. was dense. The water temperature was a consistent 11° C. Riparian vegetation shaded the stream completely.

Tule Allotment

Tule Creek [611.25, Clifton Quad, T2S,R28E. Elevation (ft): 4900] Tule Creek was surveyed 1 July approx. 800 m below ranchhouse at Tule Springs (Fig. 19).

Riparian--Canyon was wide with well developed terraces. Gradient was low. Gravel and cobble dominated substrate. Damage from 1983 flood was still obvious.

Channel was largely devoid of vegetation. An occasional walnut (20.0 - 30.0 cm DBH) could be found in the upper canopy. Banks were still being undercut. Fallen trees were common.

Terraces were cut 2.0 - 2.5 m above channel. Trees on terrace mostly occurred near bankcut. Upper canopy was dominated by walnut (25.0 - 35.0 cm DBH). Understory tree level was dominated by netleaf hackberry (15.0 - 20.0 cm DBH). Mesquite (Prosopis sp.) and catclaw acacia (Acacia constricta) dominated shrub midstory. There was a dense cover of horehound (Marrubium vulgare) and snakeweed (Gutierrizia sarothroae).

Terraces and hillsides appeared to be overgrazed. The channel itself appeared to have been scoured by high flows.

Fish--No fish were taken in 356 seconds of electrofishing in the creek. Black bullheads (Ameiurus melas) were taken in the private tank built at Tule Spring.

Water Canyon Allotment

Eagle Creek [611.25, Bee Canyon Quad, T2S,R28E,S8. Elevation (ft): 4600]

Eagle Creek was sampled 100 m downstream of Sheep Wash 14 July 1987 by AGFD and ASU personnel (Table 19). Recapture of 1 razorback sucker (Xyrauchen texanus) from prior experimental stockings at this location and 6 others 3.2 km downstream of Sheep Wash should be noted.

Fish--Habitat consisted principally of run approx. 0.3 m deep with a cobble substrate.

Historical Data.

Table 19. Historical fish collections (July 1987) from Eagle Creek on the Water Canyon allotment.

Species	Number collected
Native species	
Agosia chrysogaster	30
Catostomus sp.	1
Catostomus insignis	13
Gila robusta	1
Meda fulgida	57
Pantosteus clarki	6
Rhinichthys osculus	4
Xyrauchen texanus[1]	1
Non-native species	
Micropterus dolomeiui	5
Ameiurus natalis	5

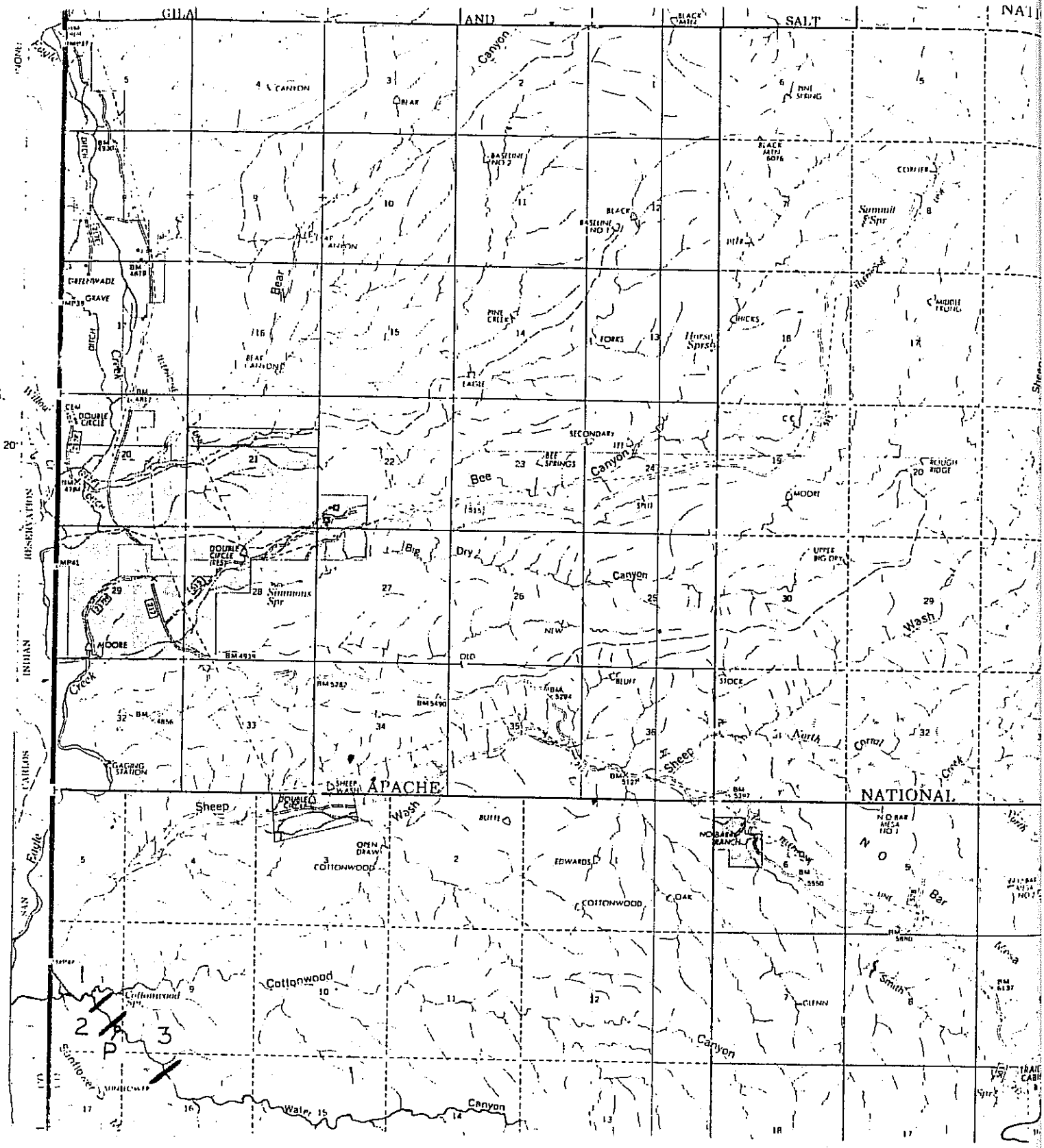
[1]TL=83.0 mm; recapture from prior experimental stocking

Water Canyon [611.25, Bee Canyon Quad, T2S,R28E. Elevation (ft): 4660 - 4800]

Water Canyon was surveyed 17 January from its confluence with Cottonwood Canyon upstream 1.6 km (Fig. 20). Three reaches were defined.

Riparian--Reach 1 consisted of a narrow canyon with low gradient and no terrace development. The channel substrate was dominated by large boulders causing the channel to be poorly defined. Flow appeared ephemeral.

Upper canopy of channel vegetation was open and dominated by sycamore (Platanus wrightii; > 50 cm DBH) growing as widely spaced individuals. Ash (Fraxinus pennsylvanica; 10.0 - 15.0 cm DBH) dominated the understory tree level. Due to constricted flow from heavy scouring and a lack of terrace development; herbaceous cover was not present.



20. Map of Water Canyon, reaches 1 - 3 on the Water Canyon allotment.

Reach 2 was similar to reach 1, except for development of narrow terraces. There was a complete lack of an upper canopy at streamside. The understory tree level was dominated by young cottonwoods (Populus sp.; 3.0 - 8.0 cm DBH). Ash of similar size were co-dominant. Alder (3.0 - 5.0 cm DBH) were uncommon. Shrub midstory consisted of shrub-sized saplings of cottonwood and ash. No understory was present because of scouring.

In Reach 3 the canyon narrowed, the gradient steepened slightly and terrace development was absent. The substrate, though consisting of a variety of particle sizes, was dominated by boulders and small outcroppings of bedrock. It appeared flow may be perennial, probably reduced to a trickle in summer.

Canopy along stream was closed in patches, but not continuously within this reach. Upper canopy was dominated by alder (15.0 - 25.0 cm DBH). Goodding's willow (Salix gooddingii; 25.0 - 35.0 cm DBH) was co-dominant. Ash and cottonwood (25.0 - 35.0 cm DBH) were minor components of upper canopy. Understory tree level dominated by smaller alder (10.0 - 15.0 cm DBH). Scouring had removed any shrub midstory or understory. Reproduction was not noted. Due to lack of terrace development there was no grass or herbaceous ground cover.

Cattle damage was restricted to the more open area at mouth of the canyon. Trailing and trampling were heavy and streamside alder exhibited lateral growth. Cattle appeared to be passing through rather than remaining for long periods in this reach. In narrow reaches of Water Canyon damage was due to high flows. The intensity of the flooding was indicated by log jams wedged in alder 3.0 m above channel floor. All mature alder showed signs of flood damage on trunks 3.0 - 4.0 m above ground level.

Fish--No fish were observed. Aquatic habitat data were not recorded.

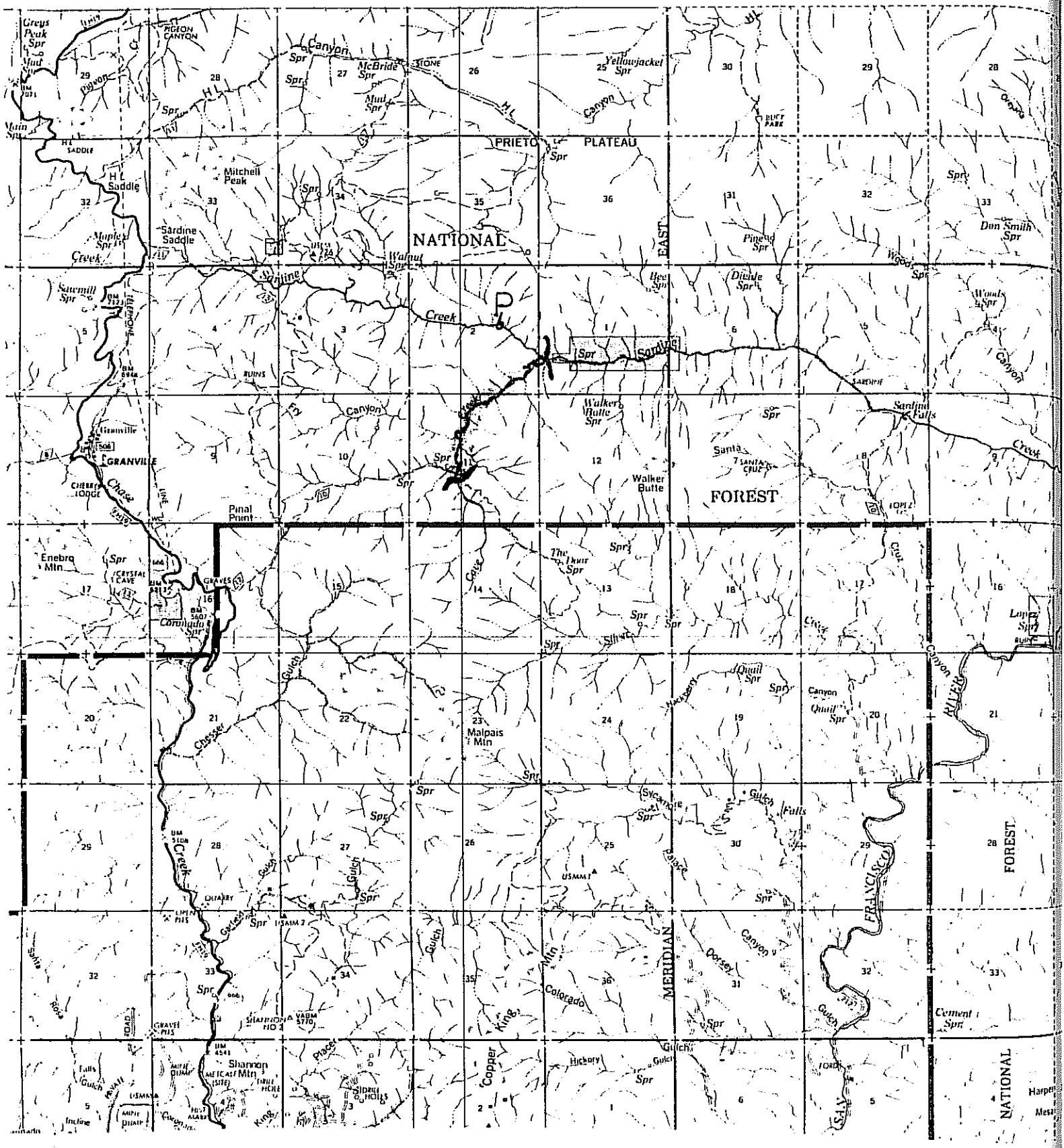
SAN FRANCISCO DRAINAGE

Granville Allotment

Cave Creek [611.072, Clifton Quad, T3S,R29E. Elevation (ft): 4960 - 5440]

Cave creek was followed for 2.1 km to reach Sardine Creek (Fig. 21). Reaches were not noted.

Riparian--Cave Creek is broad, open and rocky, and with little terrace. Sycamore was the dominant upper canopy woody species with fewer alder, boxelder, cottonwood (Populus sp.) and walnut. There were few midstory shrubs. Regeneration was poor for all species.



21. Map of Sardine and Cave Creeks on the Granville allotment.

Recent damage from grazing was apparent. Trails and cow sign were numerous. An alfalfa-like plant was commonly found nibbled to the stem base.

Fish--No fish were taken. There was very little water, mostly in shallow pools separated by dry reaches, yet it seemed consistently wet along the reach. Cladophora sp. and Nasturtium sp. were dense.

Sardine Creek [611.072, Clifton Quad, T3S,R29E. Elevation (ft): 4880 - 5120]

Sardine Creek was surveyed from the ranch property fence upstream approximately 0.7 km 28 June (Fig. 21).

Riparian--The canyon was narrow with steep walls and very little terrace. Banks and terraces were rocky, mostly cobble and/or bedrock. Vegetation was most dense in the channel. Alder dominated, especially in channel. Boxelder, cottonwood (Populus sp.), sycamore, and walnut were also included in the overstory. Arizona grape (Vitis arizonica), squawbush, and scarlet sumac were moderately abundant midstory shrub species. Tufts of grasses dotted terraces. A wide range of age classes for all species was observed. There was some bank cutting which had caused a number of trees to fall across the creek. Along the banks masses of exposed roots were common.

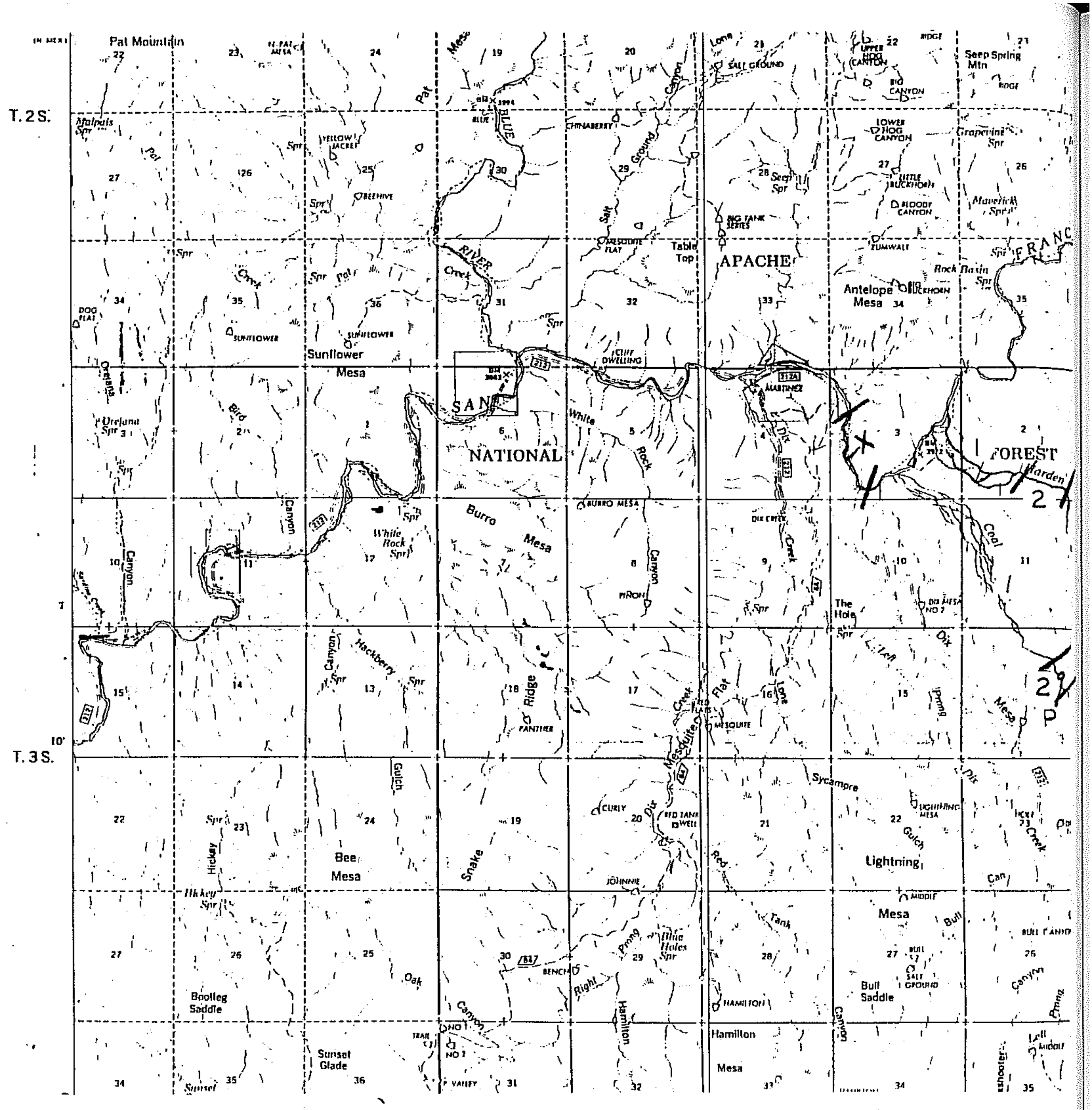
There was no sign of cattle trailing or droppings possibly because of the narrowness of the canyon and lack of terrace.

Fish--No fish were taken. The stream width averaged 0.5 m and about 5.0 cm deep. Water flowed steadily, albeit with little discharge, throughout the surveyed reach. Habitat consisted mostly of very shallow riffles and few pools. Substrate was cobble and gravel with a few large boulders. Snags were moderately common. Dense accumulations of Cladophora sp. and Nasturtium sp. were found in localized patches.

Harden Ciénega Allotment

Coal Creek [611.075, Big Lue Mts. Quad, T3S,R32E. Elevation (ft): 3920 - 4680]

Coal Creek was surveyed 9 February from its mouth to 3.2 km upstream (Fig. 22). Two reaches were described.



22. Map of Coal and Harden Cienega Creeks with corresponding reaches and San Francisco River on Harden Cienega allotment.

Riparian--Reach 1 extended from mouth to the point where canyon became very narrow. Coal Creek's channel braided through a very broad, rocky flood plain. Canyon was wide with extensive terrace development. Gradient was shallow and boulders dominated the substrate. Flow was ephemeral. Many old channels were found in the sandy soil of the terrace some of which may still carry water during large flood events.

The plant community along the stream had a broken canopy dominated by sycamore (> 50.0 cm DBH). No note was made of reproduction or shrub midstory.

Along the terraces the canopy was open and dominated by large sycamore (> 50.0 cm DBH). Arizona oak (25.0 - 40.0 cm DBH) dominated the understory tree level. The shrub midstory was dominated by Berberis sp. and mesquite (Prosopis sp.).

Reach 2, beginning approx. 2.5 km from the mouth, was characterized by narrow canyon walls, steeper gradient and a substrate dominated by large boulders and bedrock. Channel cut 3.0 - 4.0 m below well developed terraces. Mass-wasting of slopes rising above stream was common.

Canopy was open with upper canopy along stream dominated by sycamore (> 40.0 cm DBH). Understory tree level dominated by ash and cottonwood (Populus sp.; 5.0 - 10.0 cm DBH). Reproduction not vigorous but ash, cottonwood and sycamore represented by saplings (1.0 - 5.0 cm DBH) growing in small, widely scattered clumps. This reach not likely perennial but presence of small Goodding's willow suggested that bedrock in this area may force water near the surface during dryer periods.

Terraces had a more closed canopy dominated by sycamore (> 50.0 cm DBH). Juniper (Juniperus sp.; 15.0 - 25.0 cm DBH) dominated understory tree level. Grasses and herbaceous species were in good condition.

In reach 1, trailing on terraces was extensive. However, overall damage was light since the canyon was rugged with large boulders dominating both lower and upper terraces. In the restricted canyon the major damage was probably due to flooding.

Fish--No fish were taken in Coal Creek proper. Longfin dace (Agosia chrysogaster) were abundant in riffles of side channels along margin of San Francisco River where the clear water from Coal Creek entered. The water temperature was a consistent 8° C.

Harden Ciénega Creek [611.076, Big Lue Mts. Quad, T3S,R31E. Elevation (ft): 3920 - 4200]

Harden Ciénega Creek was sampled 8 February in narrows 0.6 km upstream of confluence with San Francisco River (Fig. 22). Two reaches were described.

Riparian--The first reach extended from the mouth to the point where the canyon narrowed. Canyon was very wide with good terrace development, the gradient shallow and the substrate dominated by boulders. Flow was probably ephemeral. The floodplain was wide and many old channels were found where the stream had meandered between the canyon walls over the years.

Canopy along the stream was discontinuous and dominated by sycamore (> 50.0 cm DBH). Reproduction and shrub midstory information was not recorded.

Along the terraces the canopy was open and dominated by large sycamore (> 50.0 cm DBH). Arizona oak (25.0 - 40.0 cm DBH) dominated the understory tree level. The shrub midstory was dominated by Berberis sp. and mesquite (Prosopis sp.).

Reach 2 was perennial. The canyon became very narrow with sheer walls. The gradient increased and substrate was dominated by cobbles and boulders. No terraces found within this reach.

The upper tree canopy was dominated by cottonwood (> 60.0 cm DBH) with sycamore (> 50.0 cm DBH) co-dominant. Goodding's Willow and ash were also found within the upper canopy as minor components. Such a restricted channel did not allow for much shrub midstory or understory development.

In reach 1, cattle use was moderate to heavy with extensive trailing. Cattle access was largely restricted into the canyon in reach 2, and therefore, the grazing impact was light.

Fish--Speckled dace (Rhinichthys osculus), Gila mountain sucker (Pantosteus clarki), Gila sucker (Catostomus insignis), and roundtail chub (Gila robusta) were taken (Table 20). Fish were primarily caught in riffle habitat which was more abundant, but were also taken in pools and runs. The creek averaged 3.0 m across and 0.3 m deep. Substrate consisted mostly of boulder and cobble, with lesser amounts of gravel, sand and bedrock.

Table 20. Total number, relative abundance (%), population estimate with 95% C.I. and mean CPUE, standard length (mm) and weight (gr) for species captured in Harden Ciénega Creek on the Harden Ciénega allotment 8 February 1988.

Species	Total number	Relative abundance	CPUE±Se (n) (range)	SL±Se (n) (range)	WT±Se (n) (range)	Population estimate (per 15 m of riffle)
Catostomus insignis	6	11	0.8±0.3 (9) (0 - 3)	125.0±19.0 (6) (70.0 - 193.0)	------	------
Gila robusta	17	29	2.0±0.7 (9) (0 - 6)	64.0±6.0 (17) (38.0 - 106.0)	3.0±1.0 (13) (0 - 18.0)	------
Pantosteus clarki	11	19	1.0±0.3 (9) (0 - 4)	116.0±8.0 (11) (72.0 - 155.0)	31.0±5.0 (9) (7.0 - 65.0)	------
Rhinichthys osculus	24	41	2.0±0.6 (9) (0 - 6)	59.0±2.0 (24) (36.0 - 87.0)	4.0±0.4 (22) (0 - 10)	7 (3 - 11)

Historical Data.

Harden Ciénega Creek was surveyed from 3.0 km upstream of the San Francisco River by Anderson and Turner (1977) (Table 21).

Table 21. Historical fish collections from Harden Ciénega Creek on the Harden Ciénega allotment.

	Numbers of fish collected	
Species	Anderson & Turner (1977)	Montgomery (1985)
Agosia chrysogaster	3	191
Catostomus insignis	2	12
Gila robusta	10	86
Pantosteus clarki	1	322
Rhinichthys osculus	5	497

Collections from May and December 1983 and June 1984 are also reported by Montgomery (1985). Data were included as part of a study on the wildlife and fishery of the upper Gila River.

San Francisco River [611.07, Big Lue Mts. Quad, T2-3S,R32E]

Historical Data.

Four stations along that portion of the San Francisco River on the Harden Ciénega allotment were sampled in 1977 by Anderson and Turner (1977) (Table 22). Museum records from the University of New Mexico (UNMMZ unpubl.) indicate D. Propst and others collected from the San Francisco River near Rock Basin Springs May 1984. SWCA, Inc. Montgomery (1985) sampled the San Francisco River at the mouth of Harden Ciénega creek June 1984.

Table 22. Historical fish collections from San Francisco River on the Harden Ciénega allotment.

	Number of fish collected at each station					
	Anderson & Turner (1977)				Montgomery (1985)	UNMMZ (unpubl.)
Species	7	8	9	10		
Native species						
Agosia chrysogaster	420	150	420	300	442	21
Catostomus insignis	7	10	11	110	211	3
Pantosteus clarki	21	2	--	4	41	2
Rhinichthys osculus	--	--	--	1	12	--
Tiaroga cobitis	--	--	--	--	2	1
Non-native species						
Cyprinus carpio	--	1	1	2	23	
Ictalurus punctatus	9	14	9	22	38	1
Notropis lutrensis	3	6	--	7	1	1
Pimephales promelas	3	15	--	--	--	--
Pylodictis olivaris	5	6	3	5	5	--

Hickey Allotment

San Francisco River [611.07, Big Lue Mts. Quad, T3S,R30E. Elevation (ft): 3760, 3840, 3980]

Historical Data.

Anderson and Turner (1977) sampled the San Francisco River at the mouth of the Blue River (Table 23). It was also sampled near the mouth of Hickey Canyon and at the mouth of Sardine Creek June 1984by SWCA, Inc. Data were included as part of a study on the wildlife and fishery of the upper Gila River (Montgomery 1985).

Table 23. Historical fish collections from the San Francisco River on Hickey allotment.

	Number of fish collected		
	Anderson & Turner (1977)	Montgomery (1985)	
Species	at Blue River	at Sardine	at Hickey
Native species			
Agosia chrysogaster	84	147	127
Catostomus insignis	40	31	317
Pantosteus clarki	8	--	--
Rhinichthys osculus	2	--	2
Tiaroga cobitis	--	--	15
Non-native species			
Cyprinus carpio	4	0	2
Ictalurus punctatus	1	7	0
Notropis lutrensis	6	1	1
Pylodictus olivaris	--	2	0

Pleasant Valley Allotment

Dix Creek [611.074, Big Lue Mts. Quad, T3S,R31E,S4. Elevation (ft): 4000]

Historical Data.

A 20-m section of Dix Creek was sampled by Anderson and Turner (1977) in 1977 approx. 0.9 km upstream of the mouth (Table 24). Dix Creek was also surveyed by SWCA, Inc. (Montgomery 1985) 2.4 km from its confluence with the San Francisco River. Speckled dace

(Rhinichthys osculus) and Gila mountain sucker (Pantosteus clarki) accounted for nearly 75% of the total catch. To date, no exotic species have been reported from Dix Creek. Data were included as part of a study on the wildlife and fishery of the upper Gila River. In the study Dix Creek is described as a small stream which cuts through a narrow canyon for most of its length. Substrate is composed of boulders and cobble with some bedrock. Although perennial for most of its length the lower 1.0 - 2.0 km is at times ephemeral. Riparian habitat is similar to that of Harden Ciénega Creek.

Table 24. Historical fish collections from Dix Creek on the Pleasant Valley allotment.

Species	Number of fish collected	
	Anderson & Turner (1977)	Montgomery (1985)
Agosia chrysogaster	13	11
Catostomus insignis	9	34
Pantosteus clarki	37	64
Rhinichthys osculus	28	68

San Francisco River [611.07, Big Lue Mts. Quad, T3S,R31E. Elevation (ft): 3920]

The San Francisco River was sampled 7 February approx. 0.8 km upstream of the Martinez Ranch (Fig. 22).

Riparian--No data collected.

Fish--Three native species and four non-native species were taken (Table 25). Riffles approx. 0.3 m deep and connected backwaters 0.6 m deep were sampled. Substrate in both types of habitat were predominantly sand with some cobble and boulder.

Historical Data.

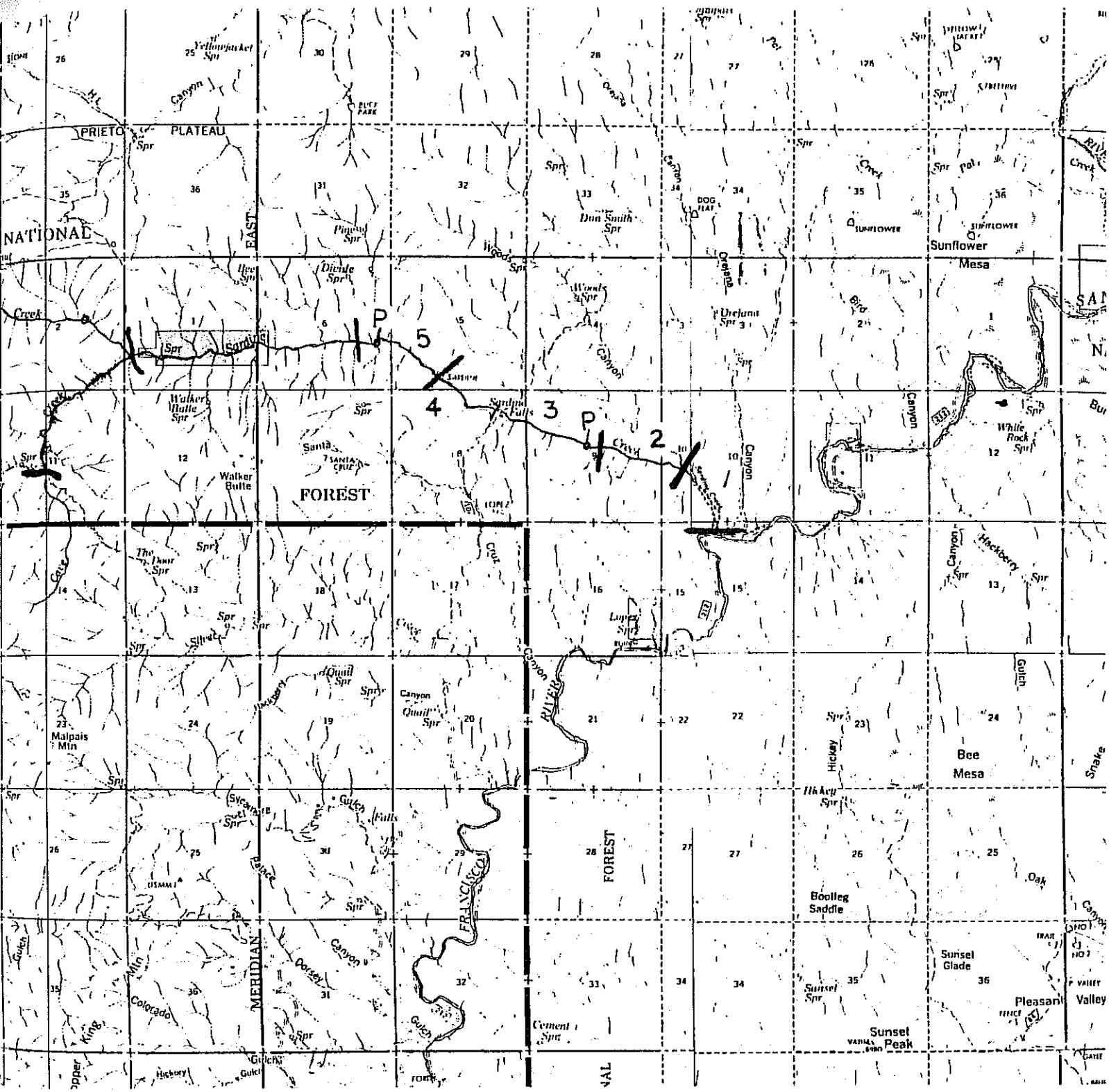
In the past the San Francisco River has been sampled near the mouth of Dix Creek on the Pleasant Valley allotment by Anderson & Turner (1977) and by SWCA, Inc. (Montgomery 1985) (Table 26).

Table 25. Total number, relative abundance and mean CPUE of species collected in the San Francisco River 0.8 km upstream of the Martinez Ranch on the Pleasant Valley allotment 7 February 1988.

Species	Total number	Relative abundance	CPUE±Se (range) (n = 5)
Native species			
Agosia chrysogaster	53	44	8.0±3.0 (0 - 18)
Catostomus insignis	2	2	0.2±0.2 (0 - 1)
Rhinichthys osculus	1	1	
Non-native species			
Gambusia affinis	18	15	
Ictalurus punctatus	1	1	0.2±0.2 (0 - 1)
Micropterus dolomeiui	1	1	
Notropis lutrensis	44	36	9.0±6.0 (1 - 35)

Table 26. Historical fish collections from the San Francisco River on the Pleasant Valley allotment.

Species	Number of fish collected	
	Anderson & Turner (1977)	Montgomery (1985)
Native species		
Agosia chrysogaster	63	504
Catostomus insignis	34	43
Pantosteus clarki	40	107
Rhinichthys osculus	--	185
Tiaroga cobitis	--	14
Non-native species		
Cyprinus carpio	3	13
Ictalurus punctatus	24	35
Notropis lutrensis	51	15
Pylodictis olivaris	4	13



23. Map of Sardine Creek, reaches 1 - 5 on the Sardine allotment.

Sardine Allotment

Sardine Creek [611.072, Clifton Quad, T3S,R30E. Elevation (ft): 4000 - 4720]

Sardine Creek was surveyed 27-28 June from the San Francisco River 2.3 km upstream and from Sardine Falls 2.8 km upstream (Fig. 23). A total of five reaches were identified beginning at the San Francisco River. The first three were below the falls and the fourth and fifth were upstream of the falls.

Riparian--Reach 1 was characterized by a wide canyon, gentle gradient, and well developed terraces 0.5 - 0.75 m above the channel. Cobbles and gravels dominated substrate through which the channel often braided. Flow in this reach was ephemeral.

Channel vegetation was dominated by burro bush (Hymenoclea monogyra) and desert broom (Baccharis sarathroides). Occasionally an isolated large sycamore (> 65.0 cm DBH) was found in tree overstory. Riparian shrubs occurred on islands in channel and at channel's edge.

Narrow terraces were dominated by netleaf hackberry (some 20.0 - 25.0 cm DBH) or mesquite (Prosopis sp.; 10 - 20 cm DBH). Shrub layer was dominated by Desert Broom. Some grasses were noted in understory. There was evidence of shrub reproduction.

In reach 2 the canyon narrowed and restricted terrace development. Flow was perennial over predominantly cobble substrate.

Riparian vegetation was dominated by an occasional large sycamore (> 65.0 cm DBH) in tree overstory and alder (3.0 - 8.0 cm DBH) in understory. Alder saplings grew in small discontinuous clumps. Shrub midstory was dominated by seep willow in widespread clumps. Alder reproduction was spotty but common. There were numerous cottonwood seedlings but none of sycamore.

Tree overstory on terraces was dominated by netleaf hackberry. Broom snakeweed comprised the shrub understory. Grasses had been grazed to basal meristem.
Canyon narrowed again in reach 3 eliminating terraces. Bedrock and large boulders dominated the substrate. Flow was perennial.

Tree overstory was dominated by large sycamore and cottonwoods (> 65.0 cm). existing as isolated individuals. Reproduction appeared good for cottonwood but sycamore saplings were widely scattered. Dense continuous stands of alder (1.0 - 5.0 cm DBH) and some shrub-sized trees formed the understory.

The area immediately below the falls was not described within a reach. Here the substrate was comprised of a variety of particle sizes with cobbles predominant. Flow was perennial. Seep willow

grew in dense stands along the channel. Large Goodding's willow and cottonwood were found downstream. Terraces were dominated by enormous specimens of netleaf hackberry (> 30.0 cm DBH) in overstory and mesquite in understory. Tree reproduction was limited to the immediate channel.

Reach 4 occurred above falls where trail crossed over to falls. In this reach the canyon was narrow with massive bedrock walls, the grade was very steep. Terraces were absent possibly because of intense scouring. Substrate was dominated by cobbles and flow was ephemeral.

Tree overstory was dominated by cottonwood saplings. Netleaf hackberry clung to the canyon walls.
In reach 5 canyon narrowed, terrace development was again noted, substrate was dominated by bedrock and large boulders or cobbles and gravel and flow was perennial.

Streamside tree overstory consisted of large sycamore (> 65.0 cm DBH) growing at margins of terrace. An occasional cottonwood (> 65.0 cm DBH) could be found. Tree understory was dominated by alder saplings (4.0 - 6.0 cm DBH). Alder stands were dense and continuous. Reproduction appeared somewhat prolific with many seedlings and shrub-sized saplings. Shrub understory along channel was lacking.

Terraces were raised 1.5 - 2.0 m above channel. Some erosion and exposed tree roots were noted. Sycamore (> 65.0 cm DBH) dominated the overstory, where the understory comprised mesquite and juniper (Juniperus sp.). Co-dominant in understory was netleaf hackberry (≥ 25.0 cm DBH). Shrub midstory absent but shrub understory dominated by Brickallia sp. Grasses were largely absent. Those present usually lacked seedheads.

Cattle damage was evident throughout most of this stretch of Sardine Creek. In reaches 1 and 2 trampling and trailing were moderately heavy. Erosion also contributed to damage in reach 2. Cattle only lightly utilized reach 3 as illustrated by dense ungrazed alfalfa at water's edge. In the area below the falls, terraces had been hit hard by cattle. Grasses were scanty and grazed to the basal meristem. Cattle use was light to moderate in reach 5. Where cattle use areas were small, damage was concentrated. Therefore, trailing and erosion of the terrace were highly visible.

Fish--Longfin dace (Agosia chrysogaster) and speckled dace (Rhinichthys osculus) were abundant below the falls in reaches with perennial water (Table 27). No fish were found above the falls. Fish habitat in reaches 2 and 3 consisted mostly of riffles with fewer pools. Stream measured approx. 0.5 m across and 25.0 cm deep. Cobble, gravel and white, volcanic bedrock composed the substrate.

Table 27. Total number, population estimate with 95% C.I. and mean CPUE, total length (mm) and weight (gr) for fish captured downstream of the falls on Sardine Creek on the Sardine allotment 27 June 1988.

Species	Total number	CPUE (n = 2) (range)	TL±Se (n) (range)	WT±Se (n) (range)	Population estimate (per 10.0 m of riffle/pool)
Agosia chrysogaster	16	6 (2) (4,8)	50±5.0 (16) (22.0 - 85.0)	2.0±0.5 (16) (<1.0 - 7.0)	8 (7 - 9)
Rhinichthys osculus	17	6 (2) (6,5)	64.0±3.0 (17) (35.0 - 83.0)	3.0±0.5 (17) (<1.0 - 6.0)	14 (9 - 19)

SUMMARY

Arizona streams now seldom are found to contain completely native assemblages of fishes. Yet, of the three drainages surveyed, only the Eagle Creek drainage had no tributary streams with a solely native fish population. The San Francisco and Blue drainages combined had a total of 8 streams with no exotic species. The most notable of these was Harden Ciénega Creek with 5 - 6 different species.

Speckled dace and longfin dace were the most ubiquitous species. No federally threatened or endangered species were taken in the tributary streams. However, there remains the possibility that the trout in Chitty Creek are the endangered native Gila trout. A definitive identification should be made to resolve this question. Additionally, the chub taken in Harden Ciénega Creek may be a state threatened sub-species and also deserves taxonomic study beyond what has been done by DeMarais (1986).

The mainstem rivers in each drainage had the greatest diversity of native and non-native species. Federally threatened spikedace were found at many locations in Eagle Creek. The loach minnow, also threatened, was found in the Blue and San Francisco Rivers. A single collection of loach minnow from Eagle Creek in 1950 is especially interesting because it appears this species has since been extirpated from that drainage.

Recaptures in Eagle Creek and Blue River of the rare razorback sucker, re-introduced to the Gila River basin through an experimental stocking program, are encouraging. These rivers may provide the necessary habitat to successfully recover this unique species.

A century of agriculture and ranching has undoubtedly modified the riparian systems of the Clifton District and consequently the distribution and abundance of the fishes. With the prevailing general paucity of historical data on these streams it is difficult to assess accurately what the changes in the fish fauna have been over the years.

In this study fish distribution was most clearly limited by permanence of water and barriers to upstream dispersal. When fish were found in tributaries they were most often captured in the lower sections closest to the mouth or, as in the case of Hannah Springs Creek, near a spring. Those sections of the tributaries which were little impacted by grazing, because they were too rugged for cattle to access, often had flowing water and, not infrequently, fish.

Overall, riparian areas on the Clifton District were heavily and negatively impacted by cattle. On many terraces the shrub and herbaceous layer was completely absent. Areas on Little Blue and Chitty Creeks where cattle had concentrated, at a saltlick or for

round-up, were badly trampled and denuded of vegetation. Severe erosion was also noted in these areas.

A particularly unique riparian system was found in Dark Canyon and along Whitewater Creek. Only these streams had Arizona cypress as a component of the riparian community. Not only were Arizona cypress present, but they were quite common. This system in general, had many very large tree specimens.

LITERATURE CITED

Arizona Game and Fish Department. 1988. Threatened native wildlife in Arizona. Arizona Game and Fish Department Publication. Phoenix.

Anderson, R. and P. Turner. 1977. Stream survey of the San Francisco River. First report to the New Mexico Department of Game and Fish, Santa Fe.

Bestgen, K.R. 1985. Results of identification of collections of larval fish made in the upper Salt and Gila Rivers. Arizona. Report to U.S. Fish and Wildlife Service. September 10, 1985, pp. 7.

DeMarais, B.D. 1986. Morphological Variation in Gila (Pisces: Cyprinidae) and Geologic History: Lower Colorado River Basin. Unpublished. MS Thesis. Arizona State University. Tempe, AZ.

Douglas, M.E., P.C. Marsh, F. Abarca and W.L. Minckley. 1988. Analysis of habitat interrelations between spikedace and red shiner. First annual report 1987-88. AGFD Contract No. G-70001. May 31, 1988.

Everhart, W.H. and W.D. Youngs. 1981. Principles of Fishery Science, 2nd ed.. Cornell University Press, Ithaca.

Kynard, B.E. 1976. A study of the pollution sources and their effect on the aquatic habitat of Eagle Creek watershed, Apache-Sitgreaves National Forest, Arizona. Final Report under Cooperative Agreement No. 16-514-CA. October 1, 1976.

Loudenslager, E.J., J.N. Rinne, G.A.E. Gall and R.E. David. 1986. Biochemical genetic studies of native Arizona and New Mexico trout. The Southwestern Naturalist 31(2):221-234.

Madsen, M.J. 1935. A biological survey of streams and lakes of Apache and Crook National Forests, Arizona. Department of Commerce, Bureau of Fisheries. Washington.

Miller, R.R. 1972. Classification of the native trouts of Arizona with the description of a new species, Salmo apache. Copeia, 1972:401-422.

Miller, R.R. and C.H. Lowe. 1964. Part 2 - An annotated check list of the fishes of Arizona. In: The vertebrates of Arizona Press. Tucson, AZ., pp. 133-151.

Minckley, W.L. 1973. Fishes of Arizona. Arizona Game and Fish Department. Phoenix, AZ., pp. 293.

Montgomery, J.M. 1985. Wildlife and fishery studies, Upper Gila water supply project. Part II: Fisheries. Submitted to U.S. Bureau of Reclamation, Boulder City, Nevada. Prepared by James M. Montgomery Consulting Engineers, Inc. Pasadena, CA, November 1985, pp. 127.

Mulch, E.E. and W.C. Gamble. 1956. Game fishes of Arizona. Arizona Game and Fish Department. Phoenix, AZ., pp. 19.

Nickolas, J.J. 1986. A Natural history for the Arizona Golden Trout, Salmo apache Miller, 1972 (Salmonidae). Dissertation, Columbia Pacific University, pp. 147.

Propst, D.L., P.C. Marsh, and W.L. Minckley. 1985. Arizona survey for spikedace (Meda fulgida) and loach minnow (Tiaroga cobitis): Fort Apache and San Carlos Apache Indian Reservations and Eagle Creek, 1985. Report to Endangered Species Office, U.S. Fish and Wildlife Service. Albuquerque, New Mexico, pp. 8.

Silvey, W.T. and M.S. Thompson. 1978. The distribution of fishes in selected streams on the Apache-Sitgreaves National Forest. Unpublished report, Arizona Game and Fish Department, Phoenix, Arizona, pp. 49.

Silvey, W., J.N. Rinne, and R. Sorenson. 1984. Index to the natural drainage systems of Arizona -- A computer compatible digital identification of perennial lotic waters. Wildlife Unit Technical Report. Southwestern Region, U.S. Forest Service, pp. 36.

UMMZ. Unpublished. Collection records from the University of Michigan Museum of Zoology. Ann Arbor.

UNMMZ. Unpublished. Records from the University of New Mexico Museum of Zoology. Albuquerque.

USFWS. 1979. Recovery plan for Gila trout (Salmo gilae Miller). Office of Endangered Species, U.S. Fish and Wildlife Service, Albuquerque, NM, pp. 45.

APPENDIX A

Photo points

1. Bear Creek

Date: 2-5-88
Time: 1130 hrs
Allotment: Sandrock
Reach: 2
Station: DP2
Legal location: Fritz Canyon Quad, T2S,R30E,S3,NW¼SE¼

Stake is downstream ~1.6 km from FS road 475. Stake is located on right bank ~9 m from mid-channel. From the stake towards the left a promontory is at 90° and on the right a promontory can be seen at 160°. Photo point is at mid-channel.

Compass readings from photo point:

168° downstream
310° upstream
220° to stake

Camera: Nikon, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

2. Chitty Creek

Date: 6-24-88
Time: 1410 hrs
Allotment: East Eagle
Reach: 1
Station: DMP003
Legal location: Hannigan Meadow Quad, T2N,R28E, SW¼NE¼

Stake is ~100 m downstream on left bank (measured along bank) from an old outhouse of an old ranch (below exclosure). At this point the channel is flowing along the left bank of the stream bed and the left bank shows some erosion. Photo point is at mid-channel and ~15 m from stake.

Compass readings from photo point:

151° downstream
338° upstream
63° to stake

Camera: Fuji HD-M, 38mm
Film speed: 200
Photographer: Diana Papoulias, AGFD

3. Chitty Creek

Date: 6-24-88
Time: 1152 hrs
Allotment: East Eagle
Reach: 4
Station: DMP002
Legal location: Hannigan Meadow Quad, T2N,R28E,SE¼SE¼

Stake is ~100 m upstream of waterfall on left bank and slightly east of trail on a large terrace (small terrace on right bank). Photo point is ~10 m from stake in mid-channel.

Compass readings from photo point:

190° downstream
326° upstream
77° to stake

Camera: Fuji HD-M, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

4. Clear Creek

Date: 2-5-88
Time: 1500 hrs
Allotment: Sandrock
Reach: 1
Station: DP3
Legal location: T1S,R30E,S35,SW¼SE¼

Stake is located ~175 m downstream from FS road 475 crossing on left bank before fence. Photo point is ~1.5 m from stake at mid-channel.

Compass readings from photo point:

92° downstream
257° upstream
356° to stake

Camera: Nikon, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

5. Coal Creek

Date: 2-9-88
Time: 1400 hrs
Allotment: Harden Ciénega
Reach: 2
Station: WCL1
Legal location: Big Lue Mts. Quad, T3S,R31E,S14,NE¼SE¼

Stake is located ~3.2 km from San Francisco River. At the point where channel begins to incise deeply there is a large pinkish boulder on the right. Stake is on stream right ~70 m upstream (measured along bank right) on an "island" terrace upstream of a medium-sized sycamore tree. Photo point is at mid-stream and ~15 m from stake.

Compass readings from stake:

336° downstream
128° upstream
44° to stake

Camera: Nikon, 38mm lens
Film speed: 64
Photographer: Diana Papoulias, AGFD

6. Cow Canyon

Date: 2-4-88
Time: 1040 hrs
Allotment: Pigeon
Reach: 2
Station: DP1
Legal location: Pipestem Mtn. Quad, T2S,R30E,S7,SW¼NE¼

To locate photo point stake, first locate survey marker off FS road 475 ~800 m (0.5 miles) above where Cow Canyon crosses road. Survey marker is on x side of road at highest point of ridge. From this marker compass reading is 55° to photo point stake which is on

stream bank right. Photo point is at first spring upstream from where FS road 475 crosses creek. Photo point is at mid-channel.

Compass readings from photo point:

100° downstream
290° upstream
230° to stake

Camera: Nikon, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

7. Dark Canyon

Date: 6-30-88
Time: 0930 hrs
Allotment: Dark Canyon
Reach: 1
Station: DMP001
Legal location: Clifton Quad, T3S,R28E,S10,SE¼SE¼

Stake is ~143 m upstream of property fence on right bank on small terrace. Stake is near a sloping canyon wall composed entirely of dirt. Photo point is left of mid-channel and ~12 m from stake.

Compass readings from photo point:

226° downstream
104° upstream
36° to stake

Camera: Olympus OM-1, 28mm lens
Film speed: 100 (but set at 200)
Photographer: Diana Papoulias, AGFD

8. Dark Canyon

Date: 6-29-88
Time: 0800 hrs
Allotment: Dark Canyon
Reach: 1
Station: DMP002
Legal location: Clifton Quad, T3S,R28E,S10,SE¼SE¼

Stake is ~640 m upstream from mouth on left bank. Stake is on a terrace, slightly downslope from a rock face and ~240 m up from th e property fence line. Photo point is at mid-channel ~15 m from stake.

Compass readings from photo point:

230° downstream
84° upstream
142° to stake

Camera: Olympus OM-1, 28mm lens
Film speed: 100 (but set at 200)
Photographer: Diana Papoulias, AGFD

9. Dark Canyon

Date: 6-29-88
Time: 0815 hrs
Allotment: Dark Canyon
Reach: 2
Station: DMP001
Legal location: Clifton Quad, T3S,R28E,S11,SW¼NE¼

Stake is ~1.0 km upstream from confluence (past property fence line). Stake is on left bank, on a terrace in front of a boulder near the corner of a fence. Photo point was at mid-channel and ~10 m from stake.

Compass readings from photo point:

188° downstream
58° upstream
125° to stake

Camera: Olympus OM-1, 28mm lens
Film speed: 100 (but set at 200)
Photographer: Diana Papoulias, AGFD

10. Eagle Creek

Date: 6-23-88
Time: 1702 hrs
Allotment: East Eagle
Reach: 3
Station: DMP001
Legal location: Robinson Mesa Quad, T2N,R29E,S19,SE¼SE¼

Go ~120 m downstream on right bank (measured along trail) from a trail sign on FS trail 33 at mouth of Crabtree Creek. Stake is across stream on left bank in a clearing. Photo point is 10 m from stake mid-channel on a large rock.

Compass readings from photo point:

234° downstream
32° upstream
128° to stake

Camera: Fuji HD-M, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

11. Hannah Springs Creek

Date: 6-14-88
Time: 1250 hrs
Allotment: Sandrock
Reach: 1
Station: DMP001
Legal location: Dutch Blue Quad, T1N,R31E,S29,SE¼NE¼

The stake is located ~800 m upstream of the mouth (measured at mid-channel) on the left bank between a group of alders in the bend just below the large pool and falls before the hot springs. The photo point is ~10 m north of the stake.

Compass readings from photo point:

300° downstream
63° upstream
158° to stake

Camera: Fuji HD-M, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

12. Hobo Canyon

Date: 6-11-88
Time: 1315 hrs
Allotment: Sandrock
Reach: 4
Station: DMP001
Legal location: Fritz Canyon Quad, T1S,R31E,S4,NE¼SE¼

The stake is located on the left bank 400 m downstream (measured at mid-channel) from the old cabin which is 2.0 km upstream from the mouth of Hobo Creek. Stake is approx. 12 m from the creek and 330° from the base of a huge cottonwood (2 m diam.), which is approx. 25 m from the creek.

Compass readings from photopoint:

220° downstream
40° upstream
120° to stake

Comments: The large cottonwood should be used as a reference in finding the photo point stake, as it is the largest tree in the ar ea and is quite visible from the creek.

Camera: Fuji HD-M, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

13. Horse Canyon

Date: 6-9-88
Time: 1650 hrs
Allotment: Sandrock
Reach: 2
Station: DMP001
Legal location: Fritz Quad, T1S,R31E,S17,SE¼NE¼

The stake is ~1.5 km upstream as measured at mid-channel from the mouth of Horse Creek. Stake is on the left bank approx. 7 m from channel under a group of juniper trees. Photo point is at mid-channel.

Compass readings from photo point:
252°
121°
204°

Comments: There were no outstanding landscape features or landmarks, therefore locating this photopoint may be difficult.

Camera: Fuji HD-M, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

14. Juan Miller Creek

Date: 2-3-88
Time: 1630 hrs
Allotment: Pigeon
Reach: n.a.
Station: DV3
Legal location: Pipestem Mtn. Quad, T2S,R29E,S11,SW¼SW¼

Stake is downstream from Juan Miller Campground and ~52 m downstre am from spring (below campground). Photo point is at mid-channel and ~10 m from stake on bank.

Compass readings from photo point:

70° downstream
255° upstream
165° to stake

Camera: Nikon, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

15. Little Blue Creek

Date: 6-14-88
Time: 1600 hrs
Allotment: Sandrock
Reach: 1
Station: DMP002
Legal location: Dutch Blue Quad, T1S,R31E,S4,NW¼NW¼

Stake is on right bank ~150 m upstream (measured at mid-channel) from Hobo Canyon. Stake is near a small walnut tree. Photo point is ~50 m from stake slightly right of mid-channel.

Compass readings from photo point:

218° downstream
16° upstream
284° to stake

Camera: Fuji HD-M, 38mm lens
Film speed: 64
Photographer: Diana Papoulias, AGFD

16. Little Blue Creek

Date: 6-18-88
Time: 1540 hrs
Allotment: Alma Mesa
Reach: 10
Station: DMP002
Legal location: Alma Mesa Quad, T2N,R31E,S24,SW¼SW¼

The stake is ~400 m downstream of fence at the Bear Valley homestead (also ~100 m downstream of the tributary which FS trail 55 follows). The stake is on the right bank near a Gambel's oak with an old,

fading trail blaze facing upstream. Stake is ~0.5 m south of trail. Photo point is at mid-channel.

Compass readings from photo point:

118° downstream
302° upstream
182° to stake

Camera: Fuji HD-M, 38mm lens
Film speed: 64
Photographer: Diana Papoulias, AGFD

17. N. Corral Creek

Date: 2-3-88
Time: 1230 hrs
Allotment: NO Bar
Reach: 1
Station: DV2
Legal location: Bee Canyon Quad, T1S,R29E,S33,NW¼SE¼

Stake is ~160 m upstream from the mouth on bank. Photo point is at mid-channel.

Compass readings from photo point:

325° downstream
160° upstream
40° to stake

Camera: Nikon, 38mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

18. Sardine Creek

Date: 6-27-88
Time: 1109 hrs
Allotment: Sardine
Reach: 3
Station: DMP001
Legal location: Clifton Quad, T3S,R30E,S9,NW¼SE¼

Stake is ~800 m upstream of confluence with San Francisco River. It is on the right bank, on a small grassy terrace. There are two huge, house-sized conglomerate boulders nearby. Upstream and around the corner of the streambed, a spire rock formation can be seen on the left bank. Photo point is ~13 m from the stake on a white slab of volcanic rock that juts out into stream.

Compass readings from photo point:

107° downstream
278° upstream
191° to stake

Camera: Fuji HD-M, 38mm lens
Film speed: 64
Photographer: Diana Papoulias, AGFD

19. Sardine Creek

Date: 6-28-88
Time: 1200 hrs
Allotment: Sardine
Reach: 5
Station: DMP002
Legal location: Clifton Quad, T3S,R30E,S6,SE¼NE¼

Stake is ~140 m downstream (measured at mid-channel) from first tributary above Sardine Falls, and ~150 m upstream from a spring on the right bank, which is itself ~100 m up a hill from the stream. Stake is on the left bank, at the NE base of a sycamore tree. Photo point is ~12 m from stake at mid-channel.

Compass readings from photo point:

85° downstream
250° upstream
320° to stake

Camera: Olympus OM-1, 28mm lens
Film speed: 64
Photographer: David Valenciano, AGFD

20. Sardine Creek

Date: 6-28-88
Time: 1325 hrs
Allotment: Granville
Reach: n.a.
Station: DMP001
Legal location: Clifton Quad, T3S,R29E,S2,NE¼SW¼

Stake is ~800 m upstream from the confluence with Cave Creek. Stake is on a terrace on the left bank, just upstream from where the canyon widens for the first time and then soon restricts. The canyon wall on the right bank is steep. The upstream end of the

terrace has a single sycamore on it. Photo point was at mid-channel.

Compass readings from photo point:

48° downstream
214° upstream
324° to stake

Camera: Fuji HD-M, 38 mm lens
Film speed: 200
Photographer: Tony Velasco, AGFD

21. Sheep Wash

Date: 1-15-88
Time: 1518 hrs
Allotment: Big Dry
Reach: 1
Station: WCL111588
Legal location: Bee Canyon Quad, T2S,R28-29E,S36,SW¼SW¼

Stake is ~95 m upstream of Eagle Creek Rd bridge on N bank. Photo point is mid-channel and ~15 m from stake.

Compass readings from photo point:

275° downstream
85° upstream

Camera: Nikon, 38 mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

22. Sheep Wash

Date: 2-3-88
Time: 1500 hrs
Allotment: Big Dry
Reach: 3
Station: DV1
Legal location: Bee Canyon Quad, T1S,R29E,S31,NW¼SW¼

Stake is ~165 m downstream from cable with fence posts suspended over stream. Stake is on W bank near big sycamore with a rock wall behind. Photo point is at mid-channel and ~15 m to stake.

Compass readings from photo point:

295° downstream
115° upstream
225° to stake

Camera: Nikon, 38 mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

23. Smith Canyon

Date: 1-16-88
Time: 1600 hrs
Allotment: NO Bar
Reach: n.a.
Station: WCL1
Legal location: Bee Canyon Quad, T2S,R29E,S6,SW¼NE¼

To get to stake drive 800 m (0.5 miles) above NO Bar ranch mailbox. Walk 205° downslope to stream. Stake is on left bank bench ~2.0 m above stream. Photo point is ~1.5 km upstream from NO Bar ranch headquarter and on left bank.

Compass readings from photo point:

285° downstream
115° upstream

Camera: Nikon, 38 mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

24. Squaw Creek

Date: 6-22-88
Time: 1140 hrs
Allotment: Sandrock
Reach: 1
Station: DMP001
Legal location: Rose Peak Quad,T1N,R30E,S33,SW¼NE¼

Stake is ~1.6 km downstream from fence separating AD Bar allotment from Sandrock allotment. Stake is on right bank next to a fence that is parallel to stream. There is a large terrace on left bank . The photo point is ~14 m from stake at mid-channel. Photo poin t is also ~2 m and 204° to a large boulder on right bank. Boulder is ~2 m high and has a Fremont cottonwood growing just upstream.

Compass readings from photo point:

56° downstream
242° upstream
356° to stake

Camera: Olympus OM-1 with a 50mm lens
Film speed: 200
Photographer: Anthony L. Velasco, AGFD

25. Squaw Creek

Date: 6-22-88
Time: 1400 hrs
Allotment: AD Bar
Reach: 3
Station: DMP002
Legal location: Rose Peak Quad,T1N,R30E,S32,NE¼SW¼

Compass readings from photo point:

65° downstream
230° upstream
285° to stake

Camera: Olympus OM-1, 50mm lens
Film speed: 200
Photographer: Anthony L. Velasco, AGFD

26. Tule Creek

Date: 7-1-88
Time: 1030 hrs
Allotment: Tule
Reach: n.a.
Station: DMP001
Legal location: Clifton Quad, T2S,R28E,S34,SW¼SE¼

No stake left at this photo point. Photo point is at mid-channel ~710 m downstream (measured at mid-channel) from ranch. Readings were taken off several peaks (refer to map x). Peak #1 32°, peak #2 268°, and a rockface of cliff to left of stream and away from stream 178°.

Compass readings from photo point:

232° downstream
50° upstream

Camera: Fuji HD-M, 38 mm lens
Film speed: 64
Photographer: Diana Papoulias, AGFD

27. Turkey Creek

Date: 2-6-88
Time: 1330 hrs
Allotment: Pigeon
Reach: 2
Station: DP2
Legal location: Pipestem Mtn. Quad, T2S,R30E,S4,SE¼NW¼

Stake is located on right bank ~320 m downstream from FS road 475. Stake is near old cattle feeder on downstream side of an alligator juniper.

Compass readings from photo point:

170° downstream
1° upstream
246° to stake

Camera: Nikon, 38 mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

28. Water Canyon

Date: 1-17-88
Time: 1145 hrs
Allotment: Water Canyon
Reach: 3
Station: WCL1
Legal location: Bee Canyon Quad, T2S,R28E,S8,SE¼SE¼

Locate log jam ~1.2 km upstream of confluence with Cottonwood Canyon. Stake is ~34 m (measured at mid-channel) upstream of log jam and on right terrace above stream. Photo point is at mid-channel and 6 m from stake.

Compass readings from photo point:

60° downstream
235° upstream
330° to stake

Camera: Nikon, 38 mm lens
Film speed: 200
Photographer: Diana Papoulias, AGFD

29. Yam Canyon

Date: 6-18-88
Time: 1145 hrs
Allotment: Alma Mesa
Reach: 1
Station: DMP001
Legal location: Alma Mesa Quad, T2N,R31E,S36,SE¼SE¼

The stake is located on the right bank in the NW corner of the first fence upstream of the confluence of Little Blue Creek and Yam Canyon. The photo point is ~4.0 m downstream from fence at mid-channel.

Compass readings from photo point:

234° downstream
34° upstream
336° to stake

Camera: Fuji HD-M, 38 mm lens
Film speed: 64 (ASA set at 100)
Photographer: Diana Papoulias, AGFD

APPENDIX B

Summary of Stream Conditions and Impacts

APPENDIX C

U.S. Forest Service Riparian Scorecards

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

(DmPool)

Apache-Sitgreaves Forest	Elevation	Squaw Ck Reach	Reach 1 Valley Form	8 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	22 June 1988 Date
Quad No.	Mapping Unit No.	Poan/Juma Vegetation Series	Ephemeral Water Permanence	Valenciano Examiner

4	3	2	1	0

A. Tree Overstory

Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses. 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand. ✓	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.

B. Shrub Midstory

Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited. ✓	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.

C. Understory

A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident. ✓	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.

D. Stream Bottom

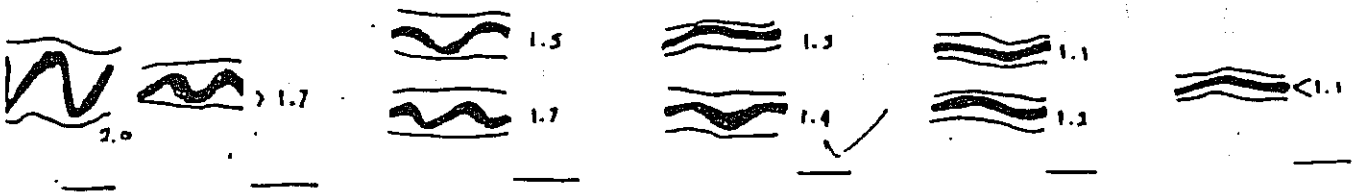
Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes. rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large. ✓	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.

E. Streambank Stability

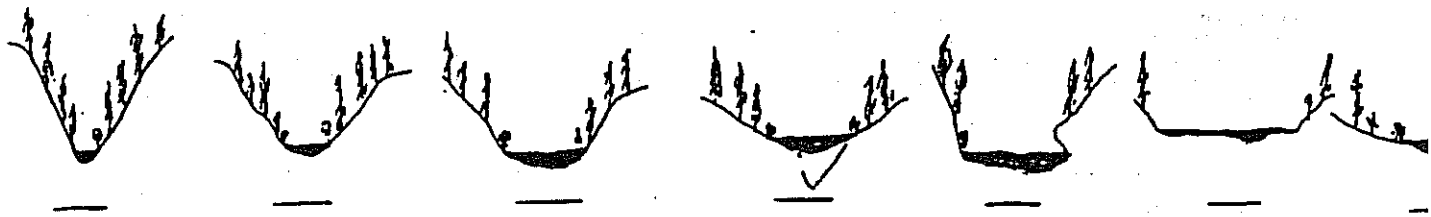
>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in flood-

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

11 + 10 = 21

Total Riparian (Annual high water width) | Aquatic width | Riparian width (feet)

Probable Damaging Agents:

None _____. 100-year Flood _____. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other Terrace on stream right has fairly dense shrub layer next to channel dominated by Rhamnus betulaefolia AND young alligator juniper. Terrace away from channel on stream right AND on ALL of stream left show signs of intensive grazing. Herbaceous cover and grasses, largely absent

Woody Overstory Species (list in order of abundance): Populus angustifolia, Juglans major, Juniperus deppeana, Pinus ponderosa

Remarks and Recommendations: Tree overstory dominated by a few scattered narrowleaf cottonwood > 85 cm in diameter. Reproduction for cottonwood consists of discontinuous small clumps of seedlings and saplings 0.5 - 2 m high. Intermediate tree level dominated by walnut 10-15 cm in diameter with alligator juniper as dominant. Midstory

Riparian Area Scorecard

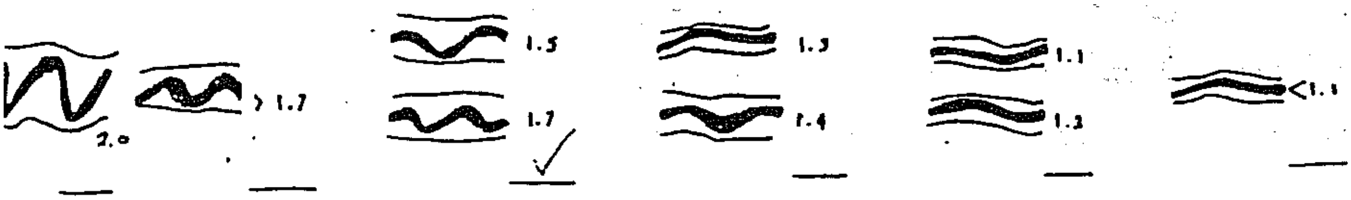
Deciduous Forest (Cold Temperate Forest) (DmP002)

Apache-Sitgreaves Forest	Elevation	Squaw Ck Reach	Reach 1 Valley Form	7 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	22 June 1988 Date
Quad No.	Mapping Unit No.	ACNE/JUMA Vegetation Series	Perennial Water Permanence	Valenciano Examiner

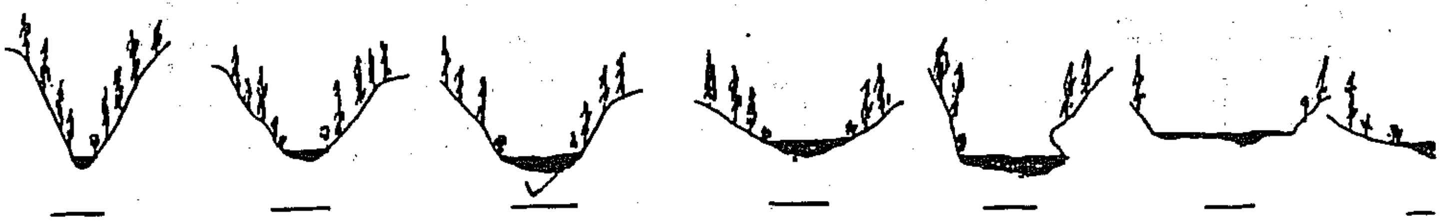
	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present. exotics and and B species a minor component. moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common. heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing. exotics invading. ✓	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy. variety of species but single A species dominance more common. growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species. ✓	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident. ✓	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large. ✓	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ____ 3.1-6.0% ✓ 6.1-10.0% ____ >10.0% ____

Area Data:

10 + 7 = 17

Total Riparian (Annual high water width) + Aquatic width = Riparian width (feet)

Probable Damaging Agents:

None ____, 100-year Flood ____, Adjacent or Upstream Development ____, Burning ✓, Big Game Browsing and Concentration ____, Livestock Grazing ✓, Tree or Shrub Removal ____, Sedimentation ____, Channelization ____, Gravel Dredging ____, Wild Fire ____, Roads ____, People Trampling ____, Concentrated and Untreated Effluents ____, Excessive Dewatering ____, Other Terraces show heavy cattle use. Bare patches of soil common, Grasses sparse and shrubs exhibit either lateral growth or breaking. Shrub midstory dominated by stunted/broken juniper and Ptelea trifoliata. Gambel's oak is dominant tree (20-30 cm in diameter) with boxelder and walnut 15-25 cm in diameter as co-dominants.

Woody Overstory Species (list in order of abundance): Acer negundo, Juglans major, Populus fremontii, Salix gooddingii

Remarks and Recommendations: Riparian vegetation along stream channel ~~restricted to~~ mostly mature trees moving toward senescence (walnuts & box elders) and young saplings 2-4 cm in diameter (cottonwood and willow). Signs of grazing on some cottonwood seedlings in channel.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Little Blue Ck Reach	(Dmp002) Reach 2 Valley Form	17 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	14 June 1988 Date
Quad No.	Mapping Unit No.	ALDER Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% cnnopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%. interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominence more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use. ✓	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
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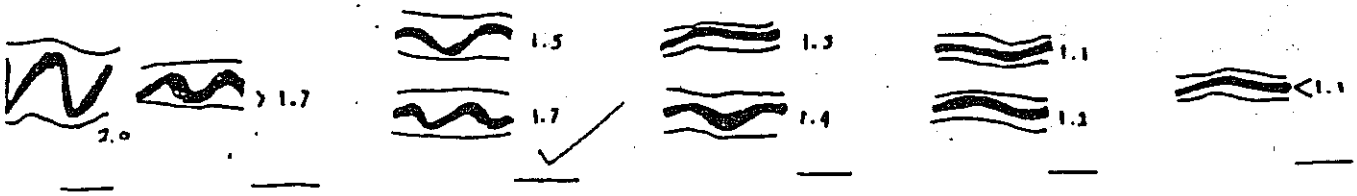
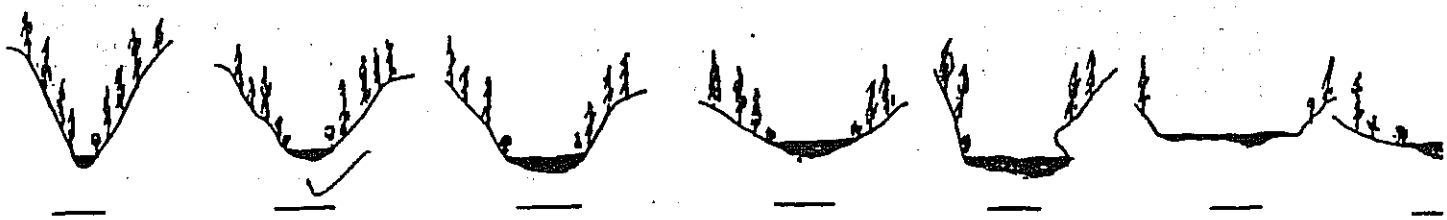
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor with deep binding root systems. No channel enlargement or flooding outside banks. ✓	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in flood-

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

39 (Total Riparian) + 10 (Aquatic width) = 49 (Riparian width (feet))
(Annual high water width)

Probable Damaging Agents:

None _____. 100-year Flood ✓. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing _____. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other TERRACE APPEARS TO HAVE BEEN GRAZED IN THE PAST. TERRACE COVER 60% MOSTLY BUNCH GRASSES AND SHRUBS, SOME FORBS. BARE SOIL PRESENT BUT NOT COMMON. SHRUB MIDSTORY DOMINATED BY YOUNG JUNIPER AND MIMOSA BIUNCIFERA. CODOMINANTS RHUS TRILOBATA AND YOUNG HACKBERRY. SYCAMORE >45 cm DOMINANT IN UPPER CANOPY, WALNUT 15-20 cm DOMINANT IN INTERMEDIATE TREE LEVEL.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, PLATANUS WRIGHTII, FRAXINUS PENNSYLVANICA, JUGLENS MAJOR.

Remarks and Recommendations: ALDERS 15-20 cm IN DIAMETER DOMINATE UPPER CANOPY ALONG STREAM. ALDER SEEDLINGS AND SAPLINGS OCCUR IN DENSE BUT DISCONTINUOUS CLUMPS. ASH SEEDLINGS AND SAPLINGS ALSO PRESENT IN CHANNEL IN SMALLER, LESS DENSE, MORE WIDELY SCATTERED CLUMPS. SYCAMORE AND ASH >40 cm IN DIAMETER OCCUPY CANOPY BUT ACTUALLY

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	6640' Elevation	Little Blue Ck Reach	(Dmp002) Reach 7 Valley Form	15 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	18 June 1988 Date
Quad No.	Mapping Unit No.	ALOR Vegetation Series	Perennial Water Permanence	Valenciano Examiner

4	3	2	1	0

A. Tree Overstory

Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.

B. Shrub Hidstory

Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.

C. Understory

A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy. ✓	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.

D. Stream Bottom

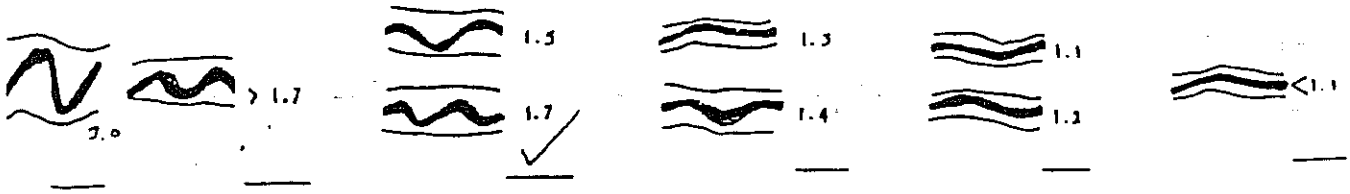
Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.

E. Streambank Stability

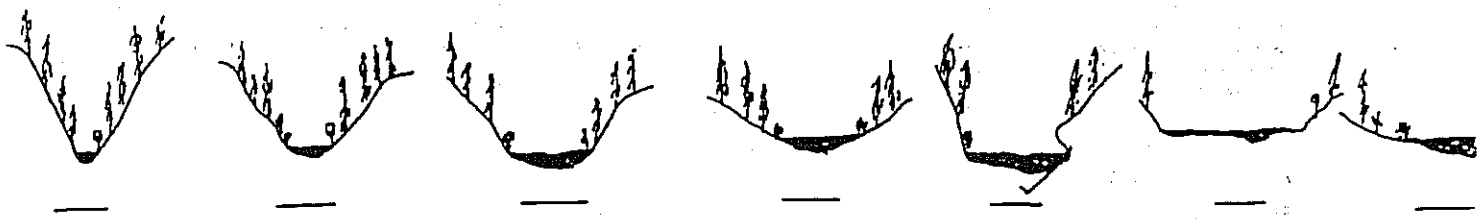
>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor with deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

13 (Total Riparian (Annual high water width)) + 5 (Aquatic width) = 18 (Riparian width (feet))

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other CATTLE DAMAGE LIMITED TO LIGHT TO MODERATE GRAZING AND TRAILING ON TERRACE. DAMAGE ALONG CHANNEL MINIMAL SINCE DOWNCUTTING OF STREAM HAS MADE ACCESIBILITY OF CHANNEL DIFFICULT FOR CATTLE. SHRUB MIDSTORY DOMINATED BY Rhamnus betulaefolia SHOWING SIGNS OF RECOVERY. UPPER CANOPY DOMINATED BY DOUGLAS FIR AND PONDEROSA PINE >25 cm in DIAMETER. INTERMEDIATE TREE LAYER DOMINATED BY GAMBELS OAK 19-35cm in DIAMETER.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA Pseudotsuga menziesii, QUERCUS GAMBELII

Remarks and Recommendations: Riparian vegetation along channel DOMINATED BY MATURE ALDERS >20 cm in DIAMETER. DOUGLAS FIR >15 cm in diameter co-DOMINANT. ALDER/BEAKED REPRODUCTION good CONSISTING of Discontinuous fairly large clumps of SAPLINGS/SEEDLINGS

Riparian Area Scorecard

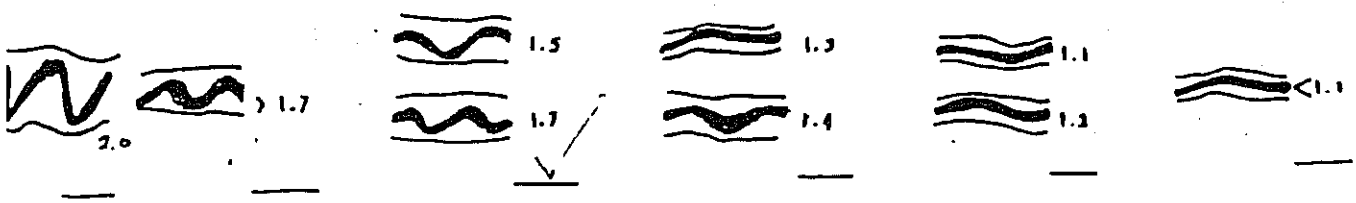
Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	5680' Elevation	Little (DmPool) Blue Ck Reach	Reach b Valley Form	14 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	19 June 1988 Date
Quad No.	Mapping Unit No.	ALOR/PLOR Vegetation Series	Perennial Water Permanence	Valenciano Examiner

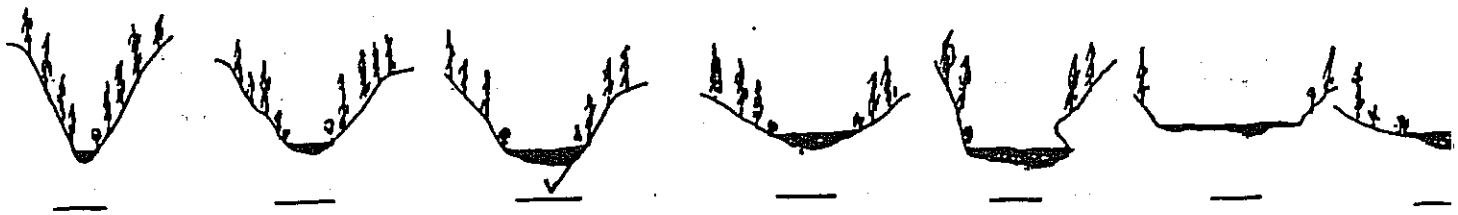
	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy, 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous. ✓	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses. 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited. ✓	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread. ✓
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w...u deep binding root systems. No channel enlargement or flooding outside banks. ✓	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

23 (Total Riparian (Annual high water width)) + 3 (Aquatic width) = 26 (Riparian width (feet))

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other Terraces heavily used by cattle with extensive trailing, large areas of exposed soil and a less extensive shrub midstory. Rhamnus betulaefolia dominant shrub with young juniper and Garrya wrightii co-dominant. Dominant tree in upper canopy are large sycamores 750cm in diameter, intermediate layer dominated by Quercus arizonica.

Woody Overstory Species (list in order of abundance): Alnus oblongifolia, Platanus wrightii, Fraxinus pennsylvanica, Populus angustifol

Remarks and Recommendations: Regeneration of trees (alders) along channel nearly continuous. Reproduction evident for all 4 species in channel but alders and narrowleaf cottonwood most numerous.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest | 5690' Elevation | Juan Miller-Ck Reach | (Dv 3) Valley Form | 13 Numeric & Ecological Rating

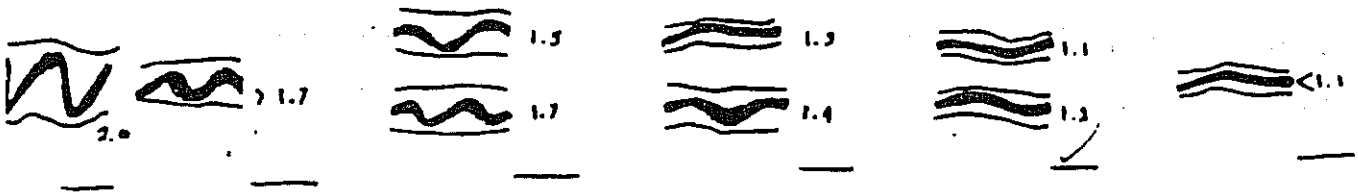
Clifton Ranger District | Blue River Drainage | T2S, R29E Legal Location | Water Regime | 3 Feb 1988 Date

Quad No. | Mapping Unit No. | Alder Vegetation Series | Water Permanence | DEV Examiner

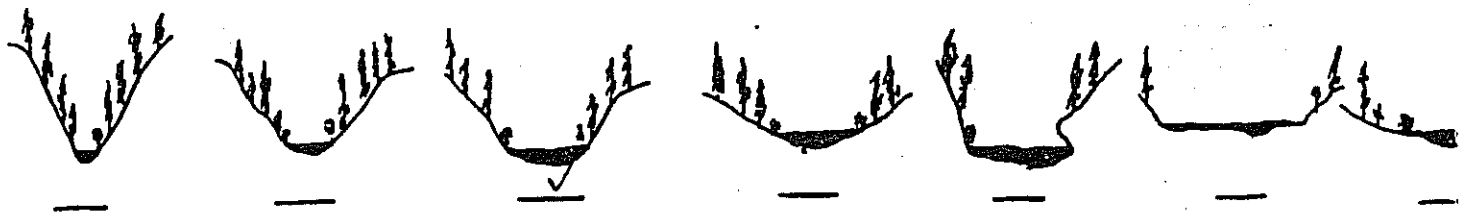
	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited. ✓	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy. ✓	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition. ✓	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w...u deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in flood-

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ✓ 3.1-6.0% _____ 6.1-10.0% _____ >10.0% _____

Area Data:

12 m (Total Riparian (Annual high water width)) + 1.5 (Aquatic width) = 13.5 m (Riparian width (feet))

Probable Damaging Agents:

None _____. 100-year Flood _____. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, QUERCUS GAMBELII, ACER NEGUNDO, PLATANUS WRIGHTII

Remarks and Recommendations: Mostly mature alders present, some young trees 2-5 tall, no visible seedlings or saplings less than 2 m tall. Bigleaf maple only shown as scattered mature individuals.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-

Sitgreaves	5000	Cowck (DPI)	Reach 2	8
Forest	Elevation	Reach	Valley Form	Numeric & Ecological Rating
Clifton	Blue River	T2 S, R30E		4 Feb 1988
Ranger District	Drainage	Legal Location	Water Regime	Date
		ALDER		DEV
Quad No.	Mapping Unit No.	Vegetation Series	Water Permanence	Examiner

4	3	2	1	0

A. Tree Overstory

Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.

Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.

Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand. ✓

Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.

Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.

B. Shrub Midstory

Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.

35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.

Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.

Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.

Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration. ✓

C. Understory

A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.

Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use.

B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.

B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.

B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread. ✓

D. Stream Bottom

Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓

Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.

Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.

Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.

Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.

E. Streambank Stability

>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.

40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.

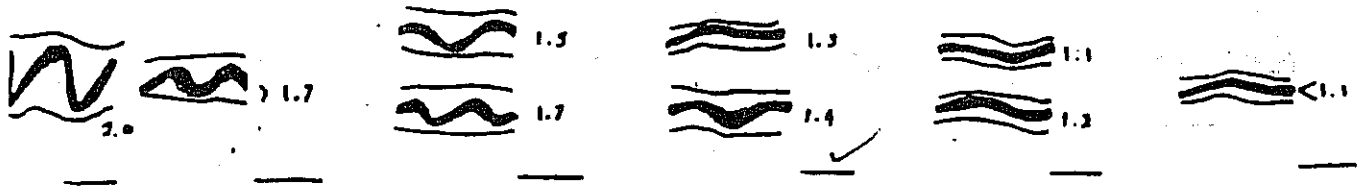
Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.

Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.

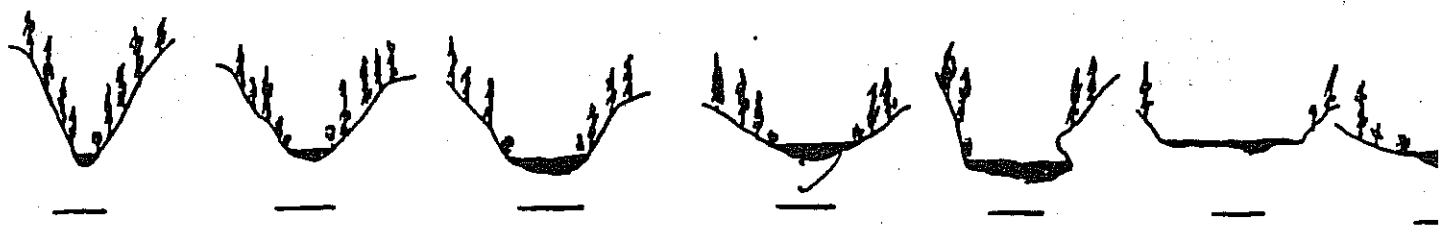
Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% _____ 6.1-10.0% ✓ >10.0% _____

Area Data:

7m + 1m = 8m

Total Riparian (Annual high water width) | Aquatic width | Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning ✓, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, PLATANUS WRIGHTII, FRAXINUS PENNSYLVANICA

Remarks and Recommendations: Obligate riparian occurrence related to bedrock intrusions forcing ground water to surface. Young alders are found in patches of alluvial gravels and sands. Raised terraces are heavily grazed, banks are cut very steeply.

Riparian Area Scorecard

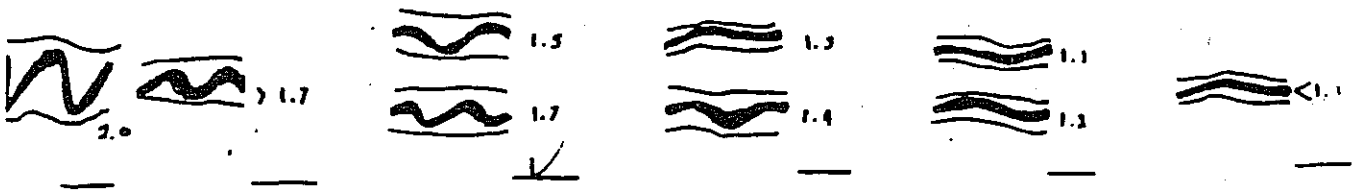
Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	4680' Elevation	Turkey Ck Reach (DP2)	Reach 2 Valley Form	14 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	T2S, R30E Legal Location	Water Regime	6 Feb 1988 Date
Quad No.	Mapping Unit No.	ACDER Vegetation Series	Water Permanence	DEV Examiner

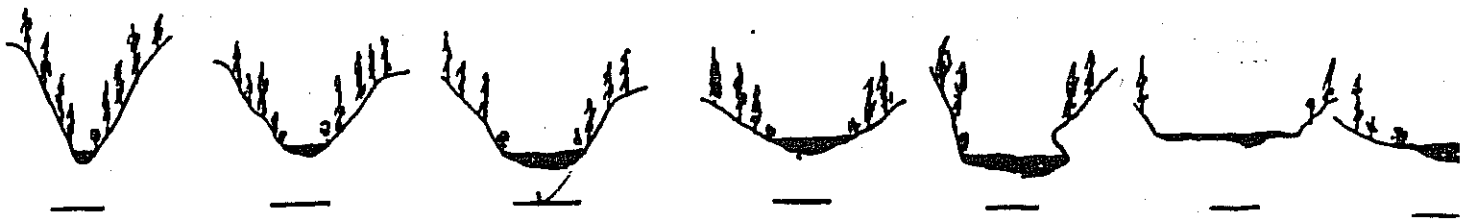
	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present. exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominence more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited. ✓	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy. ✓	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w...n deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

9 m	+	7 m	=	16 m
Total Riparian (Annual high water width)		Aquatic width		Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, FRAXINUS PENNSYLVANICA, PLATANUS WRIGHTII

Remarks and Recommendations: Area sampled just below Rapids and above falls. Grazing fairly evident, shrub layer almost non-existent. Canopy consists of primarily mature trees. Most young trees (those less than 8m tall) are green ash.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	4640 Elevation	Bear Ck Reach (DP2)	Reach 2 Valley Form	19 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	T2S, R30E Legal Location	Water Regime	5 Feb 1988 Date
Quad No.	Mapping Unit No.	Alder Vegetation Series	Water Permanence	DEV Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy, 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous. ✓	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%. ✓	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
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Riparian Area Inventory

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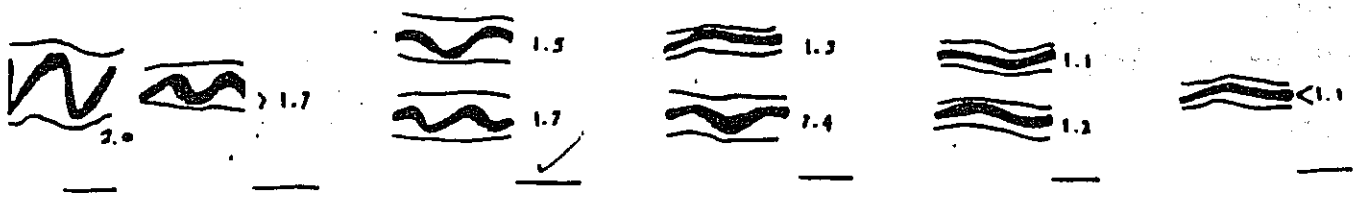
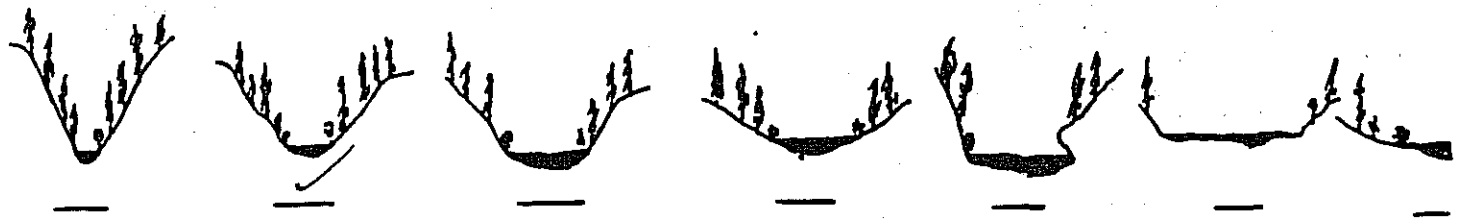


Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% _____ 6.1-10.0% ✓ >10.0% _____

Area Data:

20 (Total Riparian) + 5 (Aquatic width (Annual high water width)) = 25 m (Riparian width (feet))

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing _____, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, FRAXINUS PENNSYLVANICA, ACER NEGUNDO, PLATANUS WRIGHTII

Remarks and Recommendations: Very well developed riparian forest of Arizona alder. Old forest with some old trees dying and falling over. Seedlings occurring in patches following fallen trees - some young saplings. Livestock damage primarily horses - very little damage. Best riparian forest seen so far.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest) (DP3)

Apache-Sitgreaves Forest	4600 Elevation	clear Ck Reach	Valley Form	15 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	T2S, R30E Legal Location	Water Regime	5 Feb 1988 Date
Quad No.	Mapping Unit No.	ACDec/ASH Vegetation Series	Water Permanence	DEV Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy, 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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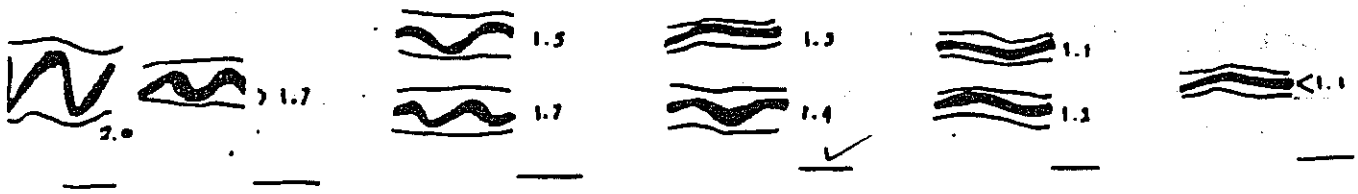
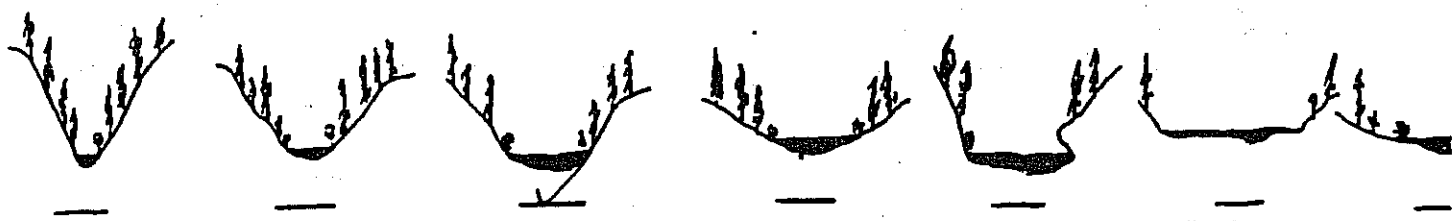
Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% _____ 6.1-10.0% ✓ >10.0% _____

Area Data:

13 m / Total Riparian (Annual high water width) + 6 m / Aquatic width = 19 m / Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, FRAXINUS PENNSYLVANICA, Populus sp., Platanus wrightii

Remarks and Recommendations: Perennial flow may be reduced to trickle forced up bedrock (in summer). Riparian forest thin, corridor with young alders mostly between 2-5 m high and many young ash and cottonwoods < 3m. Further downstream flow is ephemeral restricted to narrow canyon.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Hannah Springs Ck Reach	(Dmoo1) Reach 1 Valley Form	17 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	14 June 1988 Date
Quad No.	Mapping Unit No.	A10B/FRPF Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous. ✓	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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Riparian Area Inventory

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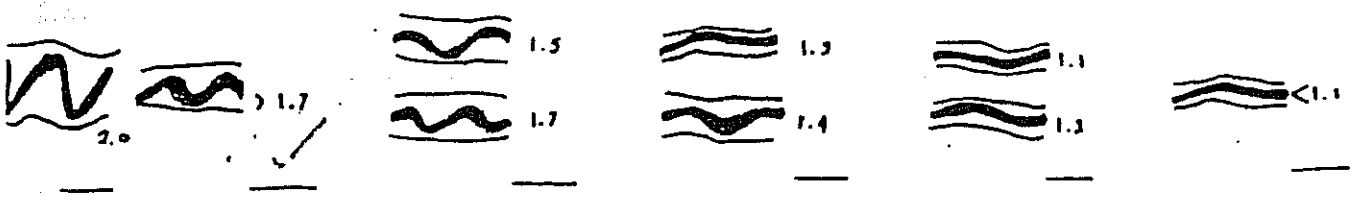
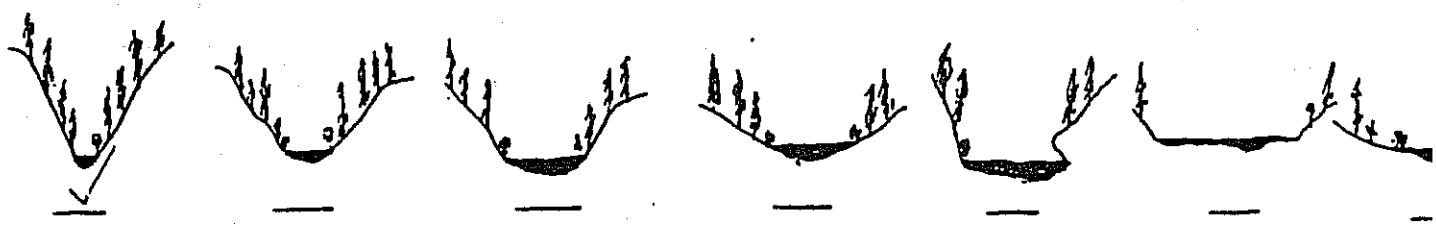


Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% _____ 6.1-10.0% ✓ >10.0% _____

Area Data:

33 / Total Riparian (Annual high water width) + 3 / Aquatic width = 36 / Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing _____, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other Damage Related to scouring action in narrow canyon.

Woody Overstory Species (list in order of abundance): Alnus oblongifolia, Fraxinus pennsylvanica, Populus fremontii

Remarks and Recommendations: Shrub midstory and understory rated higher than should have. Narrowness of canyon, large expanses of bedrock and steepness do not allow for good shrub and understory development. Sedges and shrubs that do occur show no sign of grazing. Tree understory dominated by young alders 4-10 cm in diameter. Most trees exist where protection is available

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	HUBO Canyon (DMOOD) Reach	Reach 1 Valley Form	16 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	11 June 1988 Date
Quad No.	Mapping Unit No.	ALDER Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous. ✓	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration.	Stand canopy 11-25%. interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present. exotics and and B species a minor component, moderate use or damage. regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%. trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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4 12

Riparian Area Inventory

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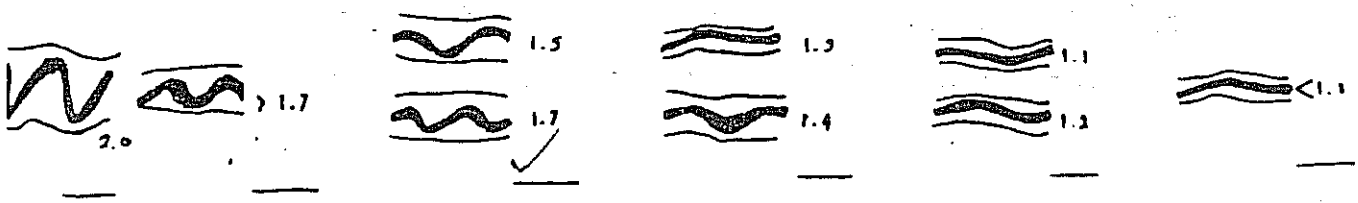
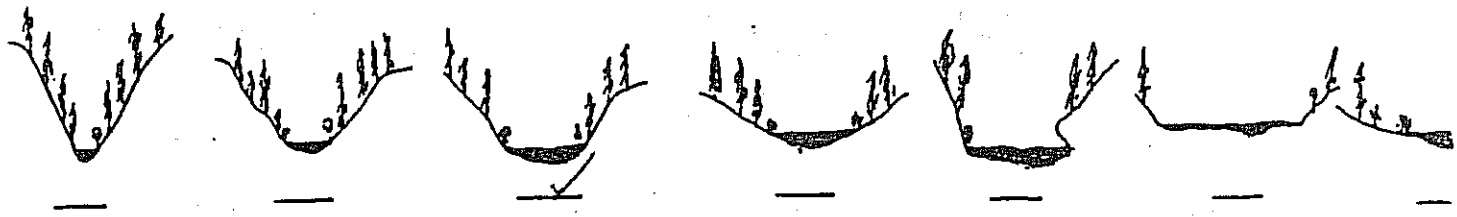


Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

18 (Total Riparian (Annual high water width)) + 3 (Aquatic width) = 21 (Riparian width (feet))

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning ✓, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other STREAM IS CUT 2.5-3 m BELOW TERRACE, MASS WASTING OF HILLSIDES IN NARROW REACHES DOWNSTREAM. SHRUB MIDDITTERY ON TERRACE DOMINATED BY DENSE STANDS OF PHAMNUS BETULAEFOLIA. REPRODUCTION OF ASH, WALNUT AND BOX ELDER ON TERRACE FAIRLY EXTENSIVE.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, JUGLANS MAJOR, FRAXINUS PENNSYLVANICA, ACER NEGUNDO

Remarks and Recommendations: RIPARIAN CONDITIONS LARGELY VERY GOOD. REPRODUCTION CURRENT FOR ALL SPECIES PARTICULARLY ALDER. VEGETATION ALONG CHANNEL DOMINATED BY YOUNG ALDER 8-10 cm IN DIAMETER. BOX ELDER, WALNUT AND ASH REPRESENTED BY MATURE TREES 30-35 cm IN DIAMETER.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

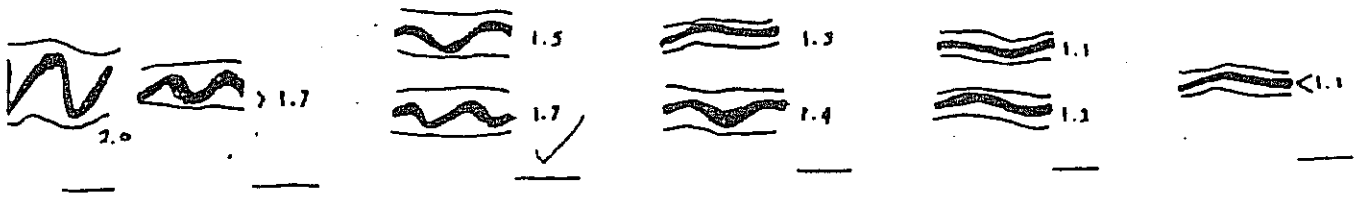
Apache-Sitgreaves Forest	Elevation	Horse Canyon Reach	(Dmp001) Reach 2 Valley Form	16 Numeric & Ecological Rating
Clifton Ranger District	Blue River Drainage	Legal Location	Water Regime	9 June 1988 Date
Quad No.	Mapping Unit No.	ALOB Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous. ✓	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use. ✓	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition. ✓	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement durin...

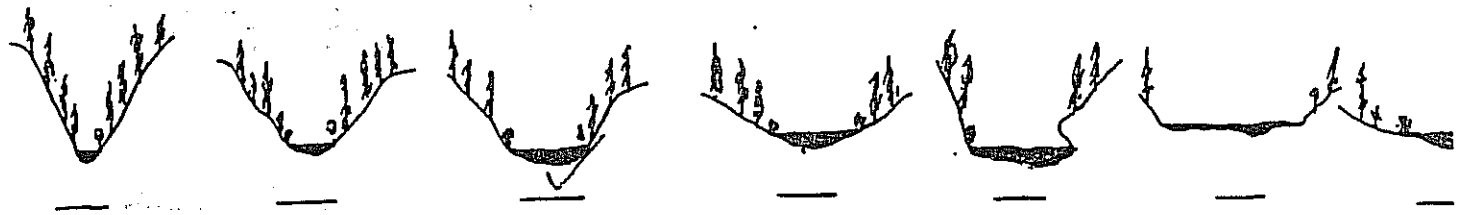
4 12

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ___/___ 6.1-10.0% _____ >10.0% _____

Area Data:

36 (Total Riparian (Annual high water width)) + 5 (Aquatic width) = 41 (Riparian width (feet))

Probable Damaging Agents:

None _____. 100-year Flood _____. Adjacent or Upstream Development _____. Burning ___/___. Big Game Browsing and Concentration _____. Livestock Grazing _____. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, Platanus wrightii, Populus fremontii, Fraxinus pennsylvanica

Remarks and Recommendations: Light grazing and moderate trampling evident in stream channel upstream (3/4 mile) from scorecard. ALDERS Dominate tree overstory averaging 3-6 cm in diameter. Tree understory Dominated By dense ALDERS 1-2 cm in diameter. Stands are dense. Regeneration vigorous

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest | ____ Elevation | Yam Canyon Reach | Reach 1 Valley Form | 8 Numeric & Ecological Rating

Clifton Ranger District | Little Blue Ck Drainage | ____ Legal Location | ____ Water Regime | 19 June 1988 Date

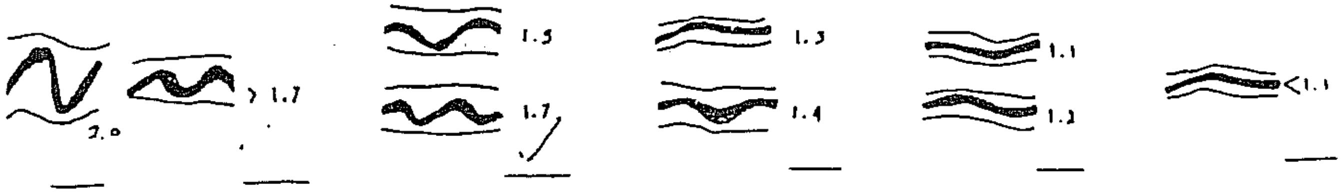
____ Quad No. | ____ Mapping Unit No. | ALOB/JUMA Vegetation Series | Perennial Water Permanence | Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species. ✓	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy. ✓	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common. ✓	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w...u deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common. ✓	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...

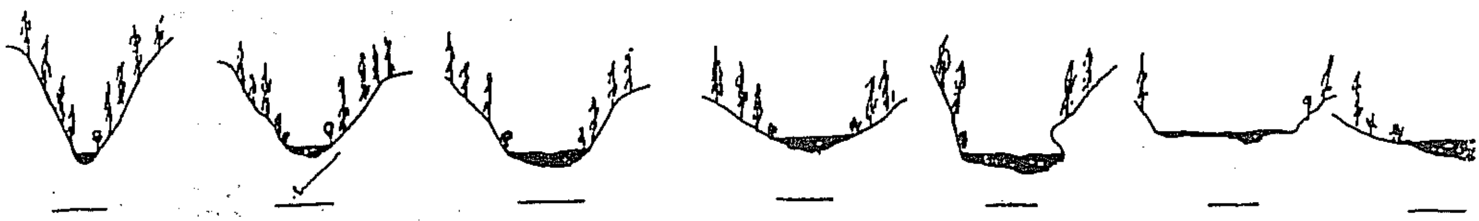
3 2 3

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ______ 3.1-6.0% ✓ 6.1-10.0% ______ >10.0% ______

Area Data:

8 + 7 = 15

Total Riparian (Annual high water width) + Aquatic width = Riparian width (feet)

Probable Damaging Agents:

None ______, 100-year Flood ✓, Adjacent or Upstream Development ______, Burning ✓, Big Game Browsing and Concentration ______, Livestock Grazing ✓, Tree or Shrub Removal ______, Sedimentation ______, Channelization ______, Gravel Dredging ______, Wild Fire ______, Roads ______, People Trampling ______, Concentrated and Untreated Effluents ______, Excessive Dewatering ______, Other Terrace shows heavy use by cattle in recent times. Very large areas of exposed soil surface. Gambel's oak seedlings with new growth being stripped total of vegetation sometime in last 6 months. Other oak seedlings grazed to nub in meantime had died. Shrub midstory reduced tremendously. Other young trees, seedlings and grasses largely absent.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, JUGLANS MAJOR, ACER NEGUNDO

Remarks and Recommendations: CHANNEL VEGETATION DOMINATED BY YOUNG ALDERS 2-4 cm in diameter. REPRODUCTION IN ALDERS REPRESENTED BY SCATTERED SMALL CLUMPS OF SAPLINGS AND SEEDLINGS. ISOLATED AND WIDELY SCATTERED ADULT ALDERS >55 cm in DIAMETER ALSO PRESENT. MAJOR DOWNCUTTING PRESENT IN THIS PORTION OF CANYON WITH UNSTABLE BANKS AND MANY FALLEN TREES. THIS SCORECARD DONE 50 METERS FROM PHOTOPOINT AT FENCELINE TO DOCUMENT

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)
(DmPo01)

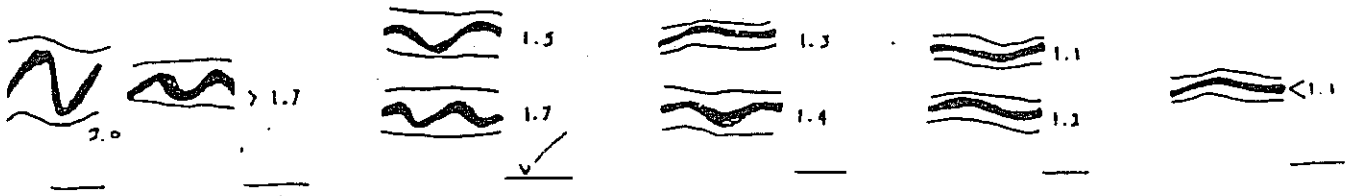
Apache-Sitgreaves Forest	6380' Elevation	Yam Canyon Reach	Reach 1 Valley Form	18 Numeric & Ecological Rating
Clifton Ranger District	Little Blue Ck Drainage	_____ Legal Location	_____ Water Regime	18 June 1988 Date
_____ Quad No.	_____ Mapping Unit No.	ALOR/ACNE Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
	✓				
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
		✓			
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
		✓			
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
	✓				
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...
	✓				

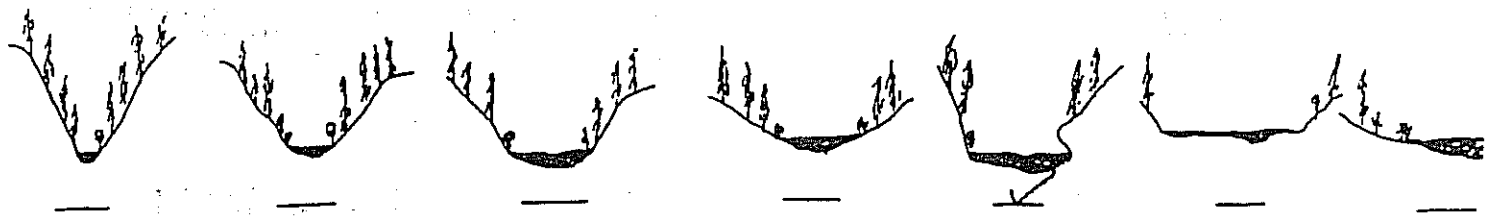
12 6

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

20 (Total Riparian) + 5 (Aquatic width) = 25 (Riparian width (feet))
(Annual high water width)

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other TERRACE VEGETATION RECOVERING, GROUND COVER PLANTS: RHUS RADICANS AND BERBERIS REPENS BEGINNING TO SPREAD. GROUND COVER NOW ABOUT 60%, TRAILING AND COW PIES STILL VISIBLE.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, ACER NEGUNDO, ABIES CONCOLOR, ACER GRANDIDENTATUM

Remarks and Recommendations: AREA ABOVE GATE HAS GOOD REGENERATION WITH ALDER SEEDLINGS AND BOX ELDER SEEDLINGS IN DISCONTINUOUS CLUMPS. ALL AGE CLASSES PRESENT FOR ALDERS. BOX ELDERS OCCUR AS MATURE TREES AND SEEDLINGS. SEVERAL LARGE ALDERS >60 cm IN DIAMETER FOUND IN CHANNEL.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

(WCL 111588)

Apache-Sitgreaves Forest	5120' Elevation	Sheep Wash Reach 1 Reach	Valley Form	9 Numeric & Ecological Rating
Clifton Ranger District	Eagle Ck Drainage	T1N, R28E Legal Location	Water Regime	15 Jan. 1988 Date
Quad No.	Mapping Unit No.	Sycamore/Alder Vegetation Series	Water Permanence	DEV Examiner

4	3	2	1	0

A. Tree Overstory

Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant. conifers infrequent. light to moderate use on regeneration. ✓	Stand canopy 11-25%. interspaces partially filled with shrubs or grasses. 2-3 size classes of trees present. exotics and and B species a minor component. moderate use or damage. regeneration just adequate to replenish stand.	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common. heavy use. seedlings and sprouts sparse and heavily damaged. new stands not establishing. exotics invading.	Canopy <5%. trees very scattered or entirely lacking. very heavy use and damage. no regeneration of native trees. exotics or C species often dominate.

B. Shrub Midstory

Shrub canopy >50%. 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear. light browsing on most A species.	35-50% shrub canopy. variety of species but single A species dominance more common. growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%. some B species which can dominate stands. lateral branching common from moderate use. regeneration limited.	Canopy coverage 10-20%. single age classes and single species commonly dominate. browsing heavy causing clubbed appearance. little to no reproduction of desirable species.	Canopy <10%. only C species present in sizeable numbers. or shrubs lacking. remnant C species severly clubbed. no regeneration. ✓

C. Understory

A species dominate. forbs limited to those which are highly palatable. >90% ground cover. plants vigorous with large seed heads. desirable seedlings filling bare spaces. or occupied by litter. light use >5%.	Some B species. up to 25% in composition but dominated by desirables. perennial forbs a component of the understory. ground cover 80-85% seed heads common. trampling minimal. light to moderate use.	B species common. few C species. 65-79% ground cover. vigor down. some seed heads on C species. soil compaction evident. use moderate to heavy.	B species dominant with a few remnant weakened relic A species. invader plants common. 50-64% ground cover. vigor down due to heavy current use. soil movement evident.	B & C species dominant. <50% ground cover. bare spaces increasing. very heavy current use. overland erosion & soil compaction widespread. ✓

D. Stream Bottom

Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition. ✓	Few particle sizes. rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.

E. Streambank Stability

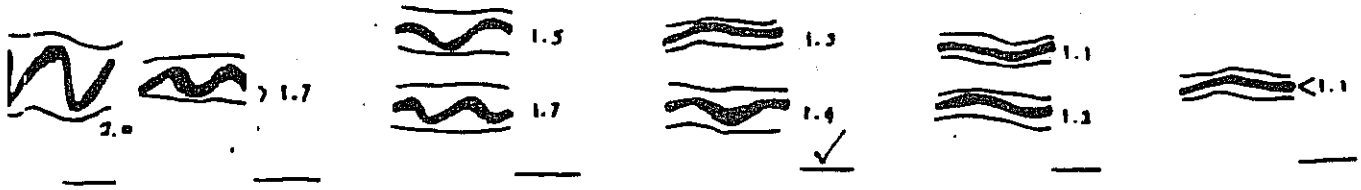
>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w...u deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...

9

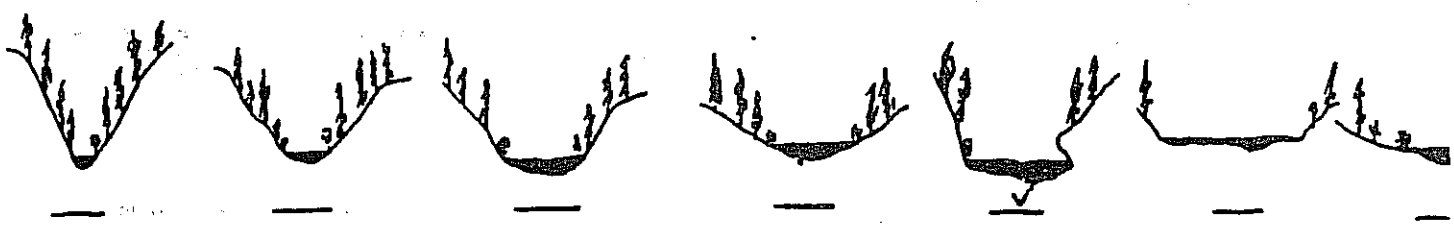
0

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ✓ 3.1-6.0% _____ 6.1-10.0% _____ >10.0% _____

Area Data:

45m	+	3m	=	48m
Total Riparian (Annual high water width)		Aquatic width		Riparian width (feet)

Probable Damaging Agents:

None _____. 100-year Flood _____. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads ✓. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other Grazing pressure fairly intense. Riprap along road before bridge indicates problems with side channel washing away road.

Woody Overstory Species (list in order of abundance): Platanus wrightii, Alnus oblongifolia, Populus fremontii, Fraxinus pennsylvanica

Remarks and Recommendations: Sycamore consists of mature trees with many seedlings and saplings. Alders are all young trees less than 5m. tall. Though the streamside vegetation has taken somewhat of a beating it is the terrace and its vegetation that has taken a serious thrashing.

Riparian Area Scorecard

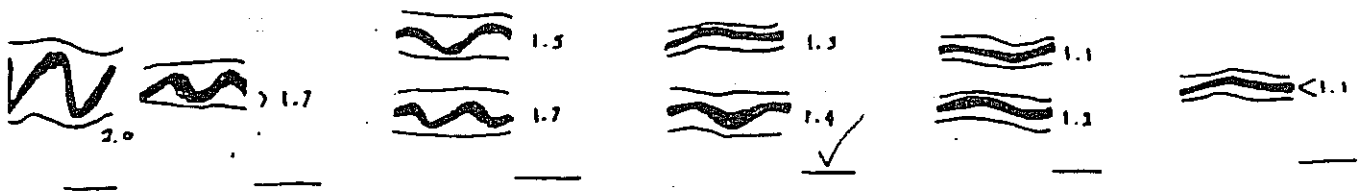
Deciduous Forest (Cold Temperate Forest) (DV1)

Apache-Sitgreaves Forest	5240' Elevation	Sheep Wash Reach	Reach 3 Valley Form	12 Numeric & Ecological Rating
Clifton Ranger District	Eagle Ck Drainage	T1S, R29E Legal Location	Water Regime	3 Feb 1988 Date
Quad No.	Mapping Unit No.	Sycamore/Ash/Alder Vegetation Series	Water Permanence	DEV Examiner

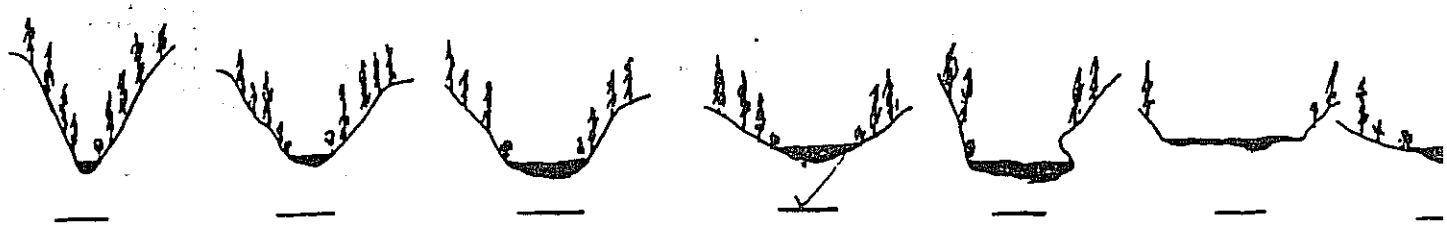
	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common. heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species. ✓	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident. ✓	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition. ✓	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks. ✓	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...
	4	6		2	

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

11 m	+	6 m	=	17 m
Total Riparian (Annual high water width)		Aquatic width		Riparian width (feet)

Probable Damaging Agents:

None _____. 100-year Flood _____. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other Grazing fairly heavy. As is the case with most other sites, shrub mid-story is non-existant

Woody Overstory Species (list in order of abundance): Platanus wrightii, Fraxinus pennsylvanica, Alnus oblongifolia.

Remarks and Recommendations: Alder consists of mature trees and young trees under 5m tall, growth fairly dense. Seedlings present-some damage

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Dark Canyon (DmPool) Reach 2 Reach	Valley Form	11 Numeric & Ecological Rating
Clifton Ranger District	Eagle Ck Drainage	Legal Location	Water Regime	29 June 1988 Date
Quad No.	Mapping Unit No.	CLIAZ/PLWR Vegetation Series	Ephemeral Water Permanence	V. Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species. ✓	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread. ✓
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...

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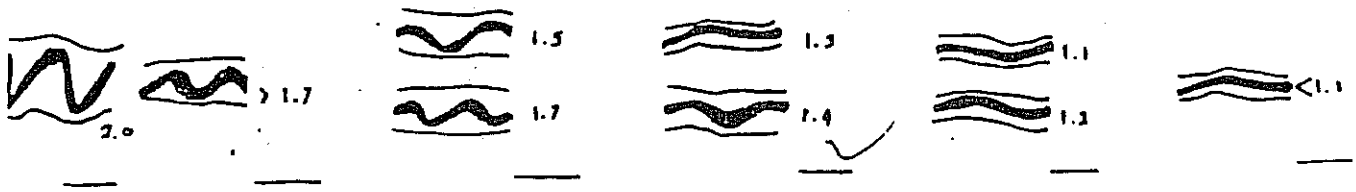
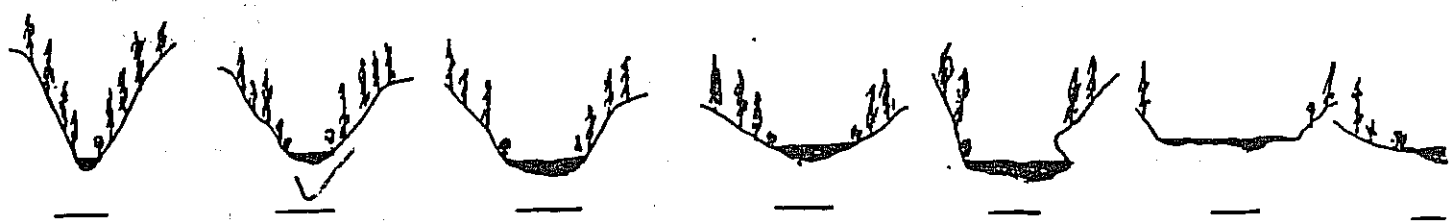
Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

8 + 7 = 15

Total Riparian (Annual high water width) | Aquatic width | Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning ✓, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other TERRACES heavily used by CATTLE - BRICKELLIA SP ONLY SHRUB PRESENT. Remaining grasses grazed down to BASAL MERISTEM. Exposed soil surfaces common. TERRACE OVERSTORY dominated by sycamore >60 cm in diameter with ALLIGATOR juniper >45 cm co-dominant. Intermediate tree level dominated by hetleaf hackberry 20-30 cm in diameter. Reproduction for trees consists primarily of dense scattered patches of hackberry

Woody Overstory Species (list in order of abundance): CUPRESSUS ARIZONICA, PLATANUS WRIGHTII

Remarks and Recommendations: TREE OVERSTORY ALONG CHANNEL DOMINATED BY ARIZONA CYPRESS >70 cm in diameter. Reproduction for cypress consists mainly of SHRUB-SIZED SAPLINGS. Sycamores co-dominate with specimens >65 cm in diameter common. No reproduction for sycamore.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Dark Canyon Reach (DmPo02)	Reach	Valley Form	11 Numeric & Ecological Rating
Clifton Ranger District	Eagle Ck Drainage	Legal Location	Water Regime	29 June 1988 Date
Quad No.	Mapping Unit No.	A1Ob/FRPE/PLWR Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occassional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% cnnopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common. heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing. exotics invading.	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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C. Understory	A species dominate, forbs limited to those which are highly palatable. >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter. light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory. ground cover 80-85% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident. use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident. ✓	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
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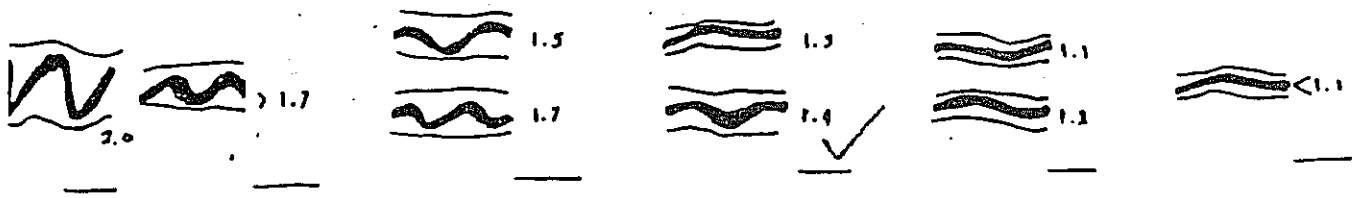
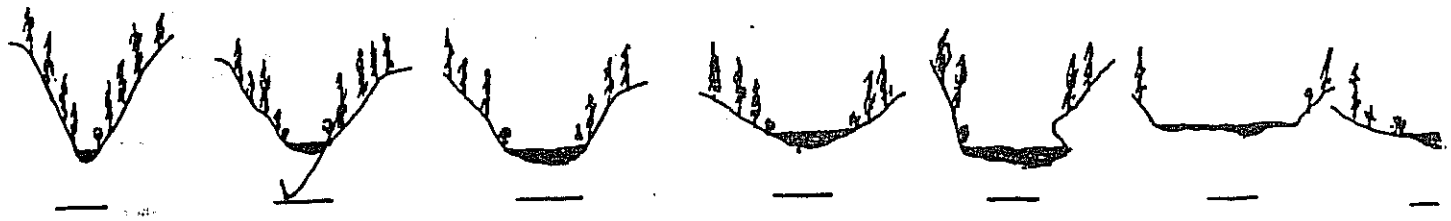
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor with deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓ 9	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common. 2	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

3.5 (Total Riparian) + 3.5 (Aquatic width) = 7 (Riparian width (feet))
(Annual high water width)

Probable Damaging Agents:

None _____. 100-year Flood ✓. Adjacent or Upstream Development _____. Burning ✓. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other Damage on terrace from cattle visible in lack of shrub midstory, absence of grass and herbaceous ground cover. Shrub midstory consists of widely scattered monocultures of Rhus glabra. Abundance of fallen trees related to senescence and floods.

Woody Overstory Species (list in order of abundance): Alnus oblongifolia, Platanus wrightii, Fraxinus pennsylvanica

Remarks and Recommendations: Tree overstory (upper canopy) dominated by ALDERS 7-45 cm in diameter. Sycamore > 60 cm in diameter are co-dominant. In open areas of canopy where senescent trees have fallen ALDER seedling AND saplings present, however the young ALDERS lack vegetation from grazing and are showing signs of lateral growth

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Dark Canyon Reach	(DMP001) Reach 1 Valley Form	10 Numeric & Ecological Rating
Clifton Ranger District	Eagle Creek Drainage	Legal Location	Water Regime	30 June 1988 Date
Quad No.	Mapping Unit No.	ALDER Vegetation Series	PERENNIAL Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition. ✓	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
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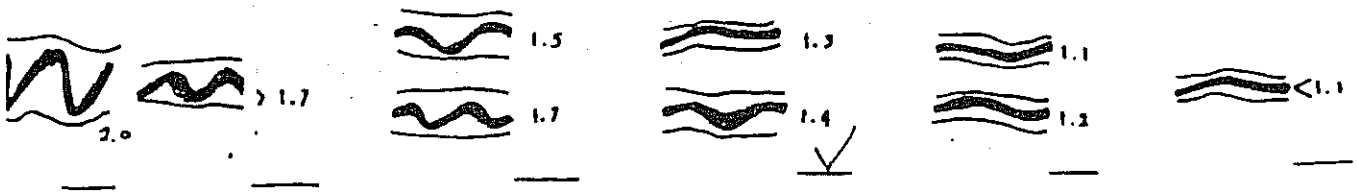
9

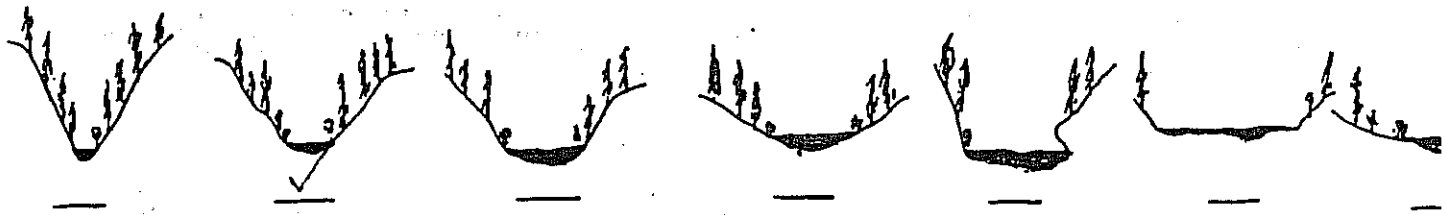
1

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

2.5 / Total Riparian (Annual high water width) + 7 / Aquatic width = 9.5 / Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other Terraces heavily grazed, shrub midstory totally absent. Shrubs only grow on sides of adjacent canyon (contrail?) along with small netleaf hackberry and juniper saplings. Bare patches of soil common, grasses, herbaceous cover entirely lacking. Sycamore dominant in upper canopy, walnut in intermediate tree level.

Woody Overstory Species (list in order of abundance): Alnus oblongifolia, Cupressus arizonica

Remarks and Recommendations: Alders Dominate upper-canopy growing in dense continuous groves with trees averaging 15-20 cm in diameter. Regeneration limited because of low light conditions. Scattered cypress 5-10cm in diameter found in intermediate tree level.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache - Sitgreaves Forest	Elevation	Chitty Canyon Reach	(DMP003) Reach L Valley Form	6 Numeric & Ecological Rating	
Clifton Ranger District	Eagle CK Drainage	Legal Location	Water Regime	24 June 1988 Date	
Quad No.	Mapping Unit No.	Juma/ACNE Vegetation Series	Perennial Water Permanence	Valenciano Examiner	

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent. light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand. ✓	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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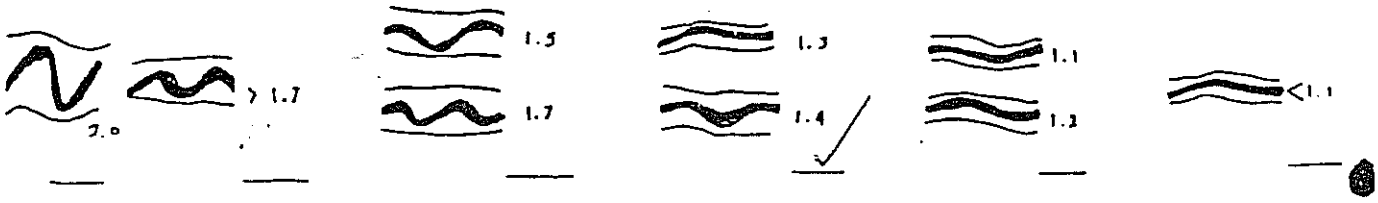
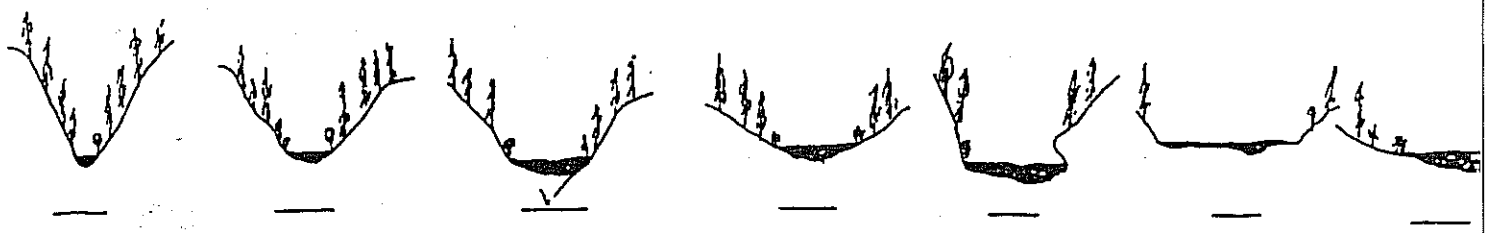
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread. ✓
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large. ✓	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor with deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare. 4	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common. ✓ 2	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement during ○

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

15 + 3 = 18

Total Riparian (Annual high water width) | Aquatic width | Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓✓✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other Terraces pounded by cattle use. Very large exposed soil surfaces common. Shrub midstory represented by monocultures of Rhus glabra with some stunted broken young juniper and Rhamnus betulaefolia occasionally found. Grasses non existent. Tree overstory dominated by Ponderosa pine and walnut dominating intermediate tree layer.

Woody Overstory Species (list in order of abundance): Juglans major, Acer negundo

Remarks and Recommendations: Riparian vegetation dominated by Juglans major in upper canopy. Shrub midstory largely absent. Reproduction by all trees severely limited. Cattle doing major damage in this stretch.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest) (Dmp002)

Apache-

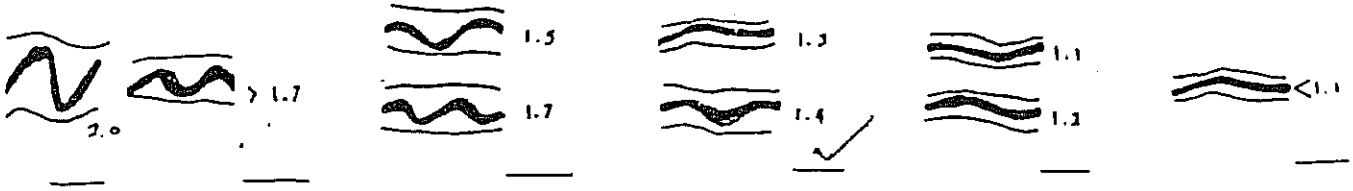
Sitgreaves Forest	Elevation	Chitty Canyon Reach	Reach 4 Valley Form	16 Numeric & Ecological Rating
Clifton Ranger District	Eagle Ck. Drainage	Legal Location	Water Region	24 June 1988 Date
Quad No.	Mapping Unit No.	ALOB/ACNE Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous. ✓	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear. light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use. ✓	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded.	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition. ✓	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...

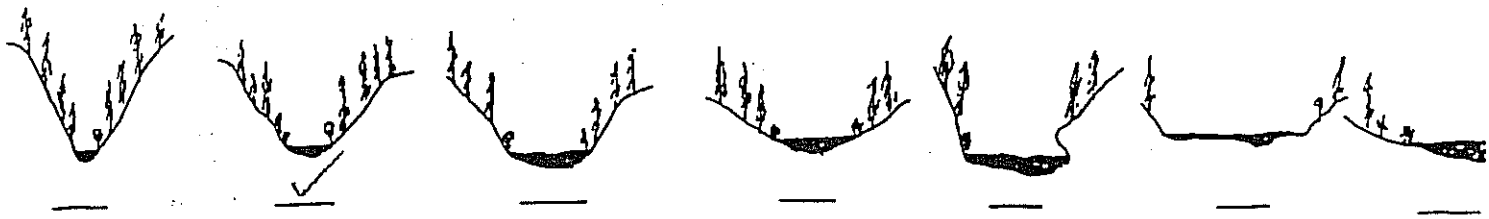
4 ✓ 12

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% _____ 6.1-10.0% ✓ >10.0% _____

Area Data:

3 (Total Riparian) + 3 (Aquatic width (Annual high water width)) = 6 (Riparian width (feet))

Probable Damaging Agents:

None _____, 100-year Flood _____, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other TERRACES show signs of CATTLE USE MOSTLY TRAMPLING OF SHRUB UNDERSTORY. SHRUB MIDSTORY DOMINATED BY RHAMNUS DETULAEFOLIA with SHRUB-SIZED WALNUT SAPLINGS AS CODOMINANT. TREE OVERSTORY (UPPER CANOPY) DOMINATED BY WALNUT with GAMBEL'S OAK DOMINANT IN INTERMEDIATE TREE LEVEL. UNDERSTORY COVER DOMINATED BY VIOLA SP. AND BRACKEN FERN.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, ACER NEGUNDO

Remarks and Recommendations: UPPER CANOPY ALONG CHANNEL DOMINATED BY MATURE ALDERS > 40cm diameter. ACER NEGUNDO DOMINATES INTERMEDIATE TREE LEVEL with TREES 25-35 cm in diameter. SHRUB MIDSTORY DOMINATED BY SHRUB-SIZED SAPLINGS of ALDERS with RHAMNUS DETULAEFOLIA AND YOUNG WALNUTS CO-DOMINANT. REPRODUCTION GOOD FOR ALL SPECIES OCCURRING

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

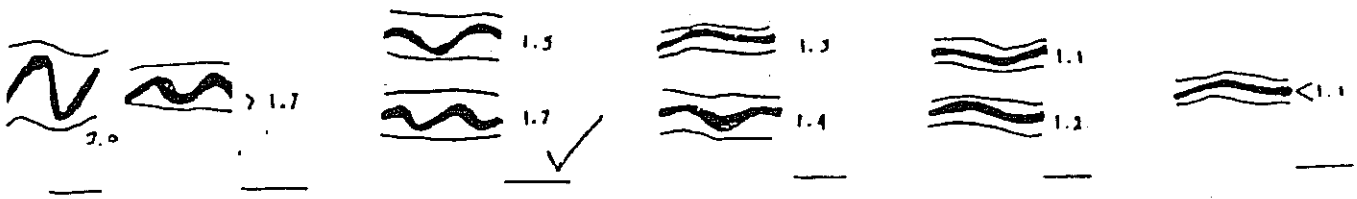
Apache-Sitgreaves Forest	6240 Elevation	East Eagle Ck Reach	(Dmpool) Reach 3 Valley Form	15 Numeric & Ecological Rating
Clifton Ranger District	Eagle Ck Drainage	Legal Location	Water Regime	23 June 1988 Date
Quad No.	Mapping Unit No.	AlOB/PoHN Vegetation Series	Ephemeral Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited. ✓	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use. ✓	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...

4 9 2

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:

Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

20 + 5 = 25

Total Riparian (Annual high water width) | Aquatic width | Riparian width (feet)

Probable Damaging Agents:

None _____. 100-year Flood _____, Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other TERRACE VEGETATION DOMINATED BY GAMBEL'S OAK WITH ARIZONA WALNUT CO-DOMINANT IN THE INTERMEDIATE TREE LAYER. UPPER CANOPY DOMINATED BY PONDEROSA PINE. GOOD REPRODUCTION BY PONDEROSA PINE AND WALNUT POOR BY GAMBELS OAK. OAK SEEDLINGS SHOW SIGNS OF GRAZING. SHRUB MIDSTORY DOMINATED BY MONOCULTURE STANDS OF RHUS GLABRA ALSO SHOWS EFFECTS OF GRAZING THROUGH BROKEN SHRUBS.

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA POPULUS ANGUSTIFOLIA, PINUS PONDEROSA, JUGLANS MAJOR

Remarks and Recommendations: UPPER CANOPY ALONG CHANNEL DOMINATED BY ARIZONA ALDER-MOSTLY MATURE TREES > 30 CM IN DIAMETER. PONDEROSA PINE CODOMINATES. SHRUB MIDSTORY LAYER DOMINATED BY SHRUB-SIZED SAPLINGS OF NARROWLEAF COTTONWOOD. REGENERATION OCCURRING MAINLY WITH NARROWLEAF COTTONWOODS. SOME TRAMPLING BY CATTLE VISIBLE ALONG STREAM.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest) (DV2)

Apache-Sitgreaves Forest	5280' Elevation	N. Corral Ck Reach 1	Valley Form	13 Numeric & Ecological Rating
Clifton Ranger District	EAGLE Ck Drainage	T15, R29E Legal Location	Water Regime	3 Feb 1988 Date
Quad No.	Mapping Unit No.	ALDER Vegetation Series	Water Permanence	DEV Examiner

4	3	2	1	0

A. Tree Overstory

Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.

B. Shrub Midstory

Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species. ✓	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.

C. Understory

A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident. ✓	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.

D. Stream Bottom

Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.

E. Streambank Stability

>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks. ✓	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement du...

8 3 2

Riparian Area Inventory

Stream Meander (Sinuosity):

_____ _____ _____ _____ ✓ _____ _____

Cross Section:

_____ _____ ✓ _____ _____ _____ _____

Gradient:

<3.0% _____ 3.1-6.0% _____ 6.1-10.0% ✓ >10.0% _____

Area Data:

14 m	+	1.5 m	=	15.5 m
Total Riparian (Annual high water width)		Aquatic width		Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other Grazing damage restricted to terraces which are well treated. Stream channel is too rough for cattle to move through freely. Sample site located below mouth of narrow canyon where high flows would be restricted. Flood damage is apparent in log jams and flood-scarred tree trunks

Woody Overstory Species (list in order of abundance): Alnus oblongifolia, Fraxinus pennsylvanica, Platanus wrightii

Remarks and Recommendations: _____

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest | 5360' Elevation | Smith Canyon Reach | (WCL1) Valley Form | 12 Numeric & Ecological Rating

Clifton Ranger District | Eagle Ck Drainage | Legal Location | Water Regime | 15 Jan 1988 Date

Quad No. | Mapping Unit No. | Sycamore/Ash Vegetation Series | Water Permanence | DEV, WCL Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy, 4 or more size classes, A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes, deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand. ✓	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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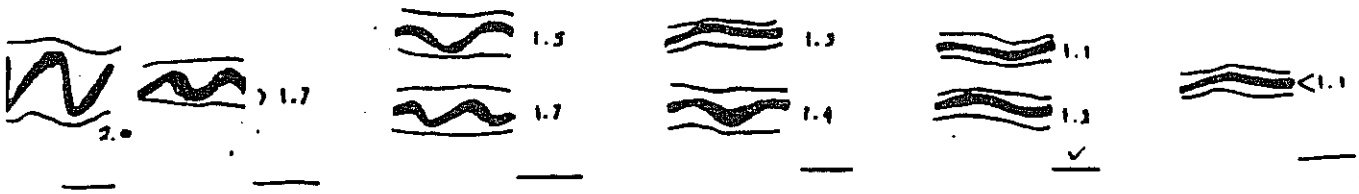
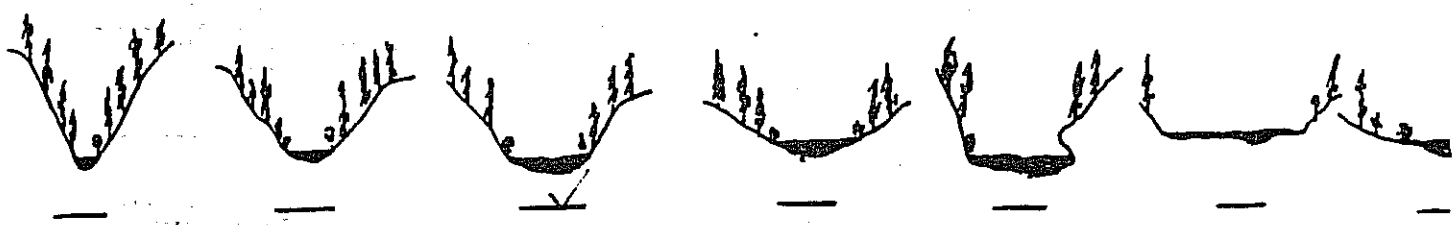
6 6

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

10 M	+	1 M	=	11 M
Total Riparian (Annual high water width)		Aquatic width		Riparian width (feet)

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning _____, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other grazing the more damaging agent with well worn trails and moderately heavy Rhus glabra

Woody Overstory Species (list in order of abundance): Platanus wrightii, Fraxinus pennsylvanica, Alnus oblongifolia

Remarks and Recommendations: Rhus glabra understory dense in some localities.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest | 4880 Elevation | Water Canyon Reach | Reach 3 (WCL1) Valley Form | 11 Numeric & Ecological Rating

Clifton Ranger District | Eagle Ck Drainage | T2S, R28E, 17 Legal Location | Water Regime | 17 Jan 1988 Date

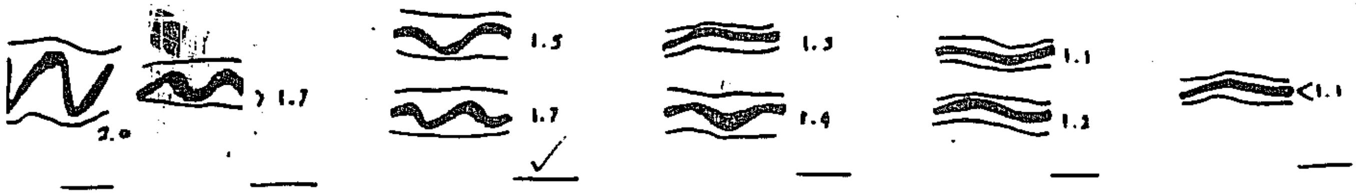
Quad No. | Mapping Unit No. | Alder/willow Vegetation Series | Water Permanence | DEV, WCL Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant. occasional conifers. light use. regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant. conifers infrequent. light to moderate use on regeneration. ✓	Stand canopy 11-25%. interspaces partially filled with shrubs or grasses. 2-3 size classes of trees present. exotics and and B species a minor component. moderate use or damage. regeneration just adequate to replenish stand.	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common. heavy use. seedlings and sprouts sparse and heavily damaged. new stands not establishing. exotics invading.	Canopy <5%. trees very scattered or entirely lacking. very heavy use and damage. no regeneration of native trees. exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%. 2 or more A shrub species present. but a single genus such as Salix may dominate. growth form linear. light browsing on most A species.	35-50% shrub canopy. variety of species but single A species dominance more common. growth form mainly linear but some lateral branching from light browsing.	Canopy coverage 21-35%. some B species which can dominate stands. lateral branching common from moderate use. regeneration limited.	Canopy coverage 10-20%. single age classes and single species commonly dominate. browsing heavy causing clubbed appearance. little to no reproduction of desirable species.	Canopy <10%. only C species present in sizeable numbers. or shrubs lacking. remnant C species severly clubbed. no regeneration. ✓
C. Understory	A species dominate. forbs limited to those which are highly palatable. >90% ground cover. plants vigorous with large seed heads. desirable seedlings filling bare spaces. or occupied by litter. light use >5%.	Some B species. up to 25% in composition but dominated by desirables. perennial forbs a component of the understory. ground cover 80-89% seed heads common. trampling minimal. light to moderate use.	B species common. few C species. 65-79% ground cover. vigor down. some seed heads on C species. soil compaction evident. use moderate to heavy.	B species dominant with a few remnant weakened relic A species. invader plants common. 50-64% ground cover. vigor down due to heavy current use. soil movement evident.	B & C species dominant. <50% ground cover. bare spaces increasing. very heavy current use. overland erosion & soil compaction widespread. ✓
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present. rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes. rocks subangular. some rounded. but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon. but those present are large.	Large rocks dominate. most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad. shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w...u deep binding root systems. No channel enlargement or flooding outside banks. ✓	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage. mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable. do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad. shallow. with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur... 0

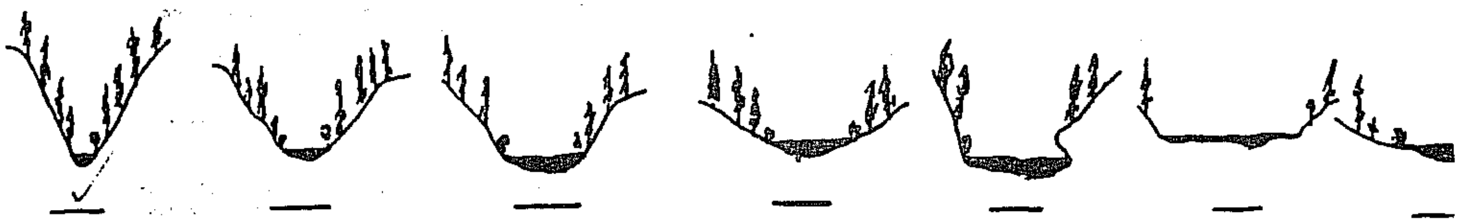
8 3

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ✓ 3.1-6.0% ____ 6.1-10.0% ____ >10.0% ____

Area Data:

4 m + 0.5 m = 4.5 m

Total Riparian (Annual high water width) + Aquatic width = Riparian width (feet)

Probable Damaging Agents:

None ____, 100-year Flood ✓, Adjacent or Upstream Development ____, Burning ____, Big Game Browsing and Concentration ____, Livestock Grazing ____, Tree or Shrub Removal ____, Sedimentation ____, Channelization ____, Gravel Dredging ____, Wild Fire ____, Roads ____, People Trampling ____, Concentrated and Untreated Effluents ____, Excessive Dewatering ____, Other Though there was some sign of cattle water flows through very narrow canyon with much exposed rock. Primary damaging agent is flooding – absence of seedlings and saplings plus lack of grasses is due solely to flood damage.

Woody Overstory Species (list in order of abundance): Alnus oblongifolia, Salix gooddingii, Populus fremontii, Fraxinus pennsylvanica

Remarks and Recommendations: Downstream canyon opens up, terrace there shows sign of heavy use – well worn trails, trampling, lateral growth on alders. At this site where canyon narrows heavy scouring has removed saplings, deposited massive log jams 3 m above channel floor. All mature alders show signs of flood damage on trunks 3-4 m above ground level.

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)
(DMP001)

Ap-SIT		SARDINE	REACH 2	16
Forest	Elevation	Reach	Valley Form	Numeric & Ecological Rating
Clifton	SAN FRAN			28 June 1988
Ranger District	Drainage	Legal Location	Water Regime	Date
		ALDER	PERENNIAL	PAPOULIAS
Quad No.	Mapping Unit No.	Vegetation Series	Water Permanence	Examiner

4	3	2	1	0

A. Tree Overstory

Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.

B. Shrub Midstory

Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominence more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.

C. Understory

A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirble seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-85% seed heads common, trampling minimal, light to moderate use. ✓	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy.	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.

D. Stream Bottom

Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.

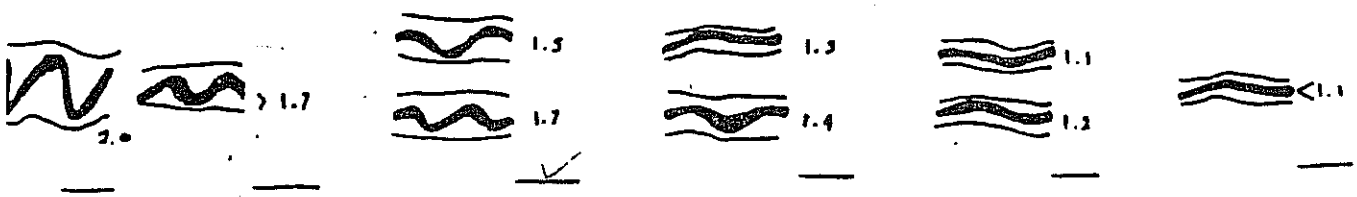
E. Streambank Stability

>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement duri...

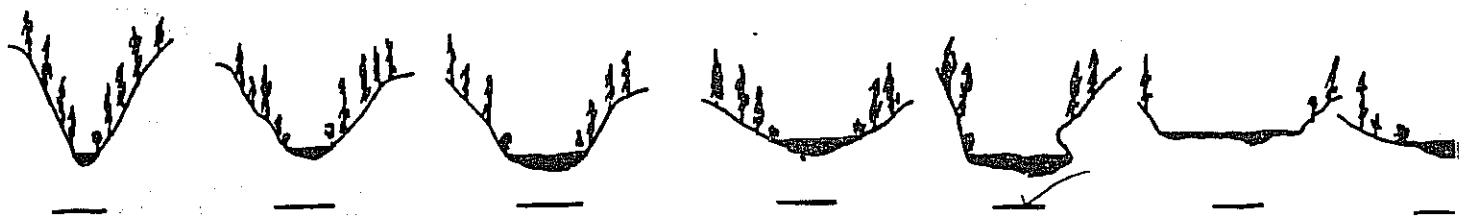
4 12

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ✓ 3.1-6.0% _____ 6.1-10.0% _____ >10.0%

Area Data:

14 (Total Riparian) + 1 (Aquatic width (Annual high water width)) = 15 (Riparian width (feet))

Probable Damaging Agents:

None _____. 100-year Flood _____. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other _____

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, BACCHARIS WRIGHTII

Remarks and Recommendations: Very little terrace, CANYON NARROW. WHAT TERRACE there is is rocky + w/ little vegetation. MOST WOODY VEGETATION IN CHANNEL. MANY FALLEN TREES. SUMAC + LEGUMINOUS (ACACIA-LIKE) PLANTS ABUNDANT. SYCAMORES WALNUT, COTTONWOOD PRESENT, SCARCE. GRASSES present on terrace. NO COW TRAILS OR COW PIES. REGENERATION OF ALDERS IS GOOD, MANY AGE CLASSES

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Sardine Ck Reach	Reach 3 (DmPo01) Valley Form	13 Numeric & Ecological Rating
Clifton Ranger District	San Francisco R. Drainage	Legal Location	Water Regime	27 June 1988 Date
Quad No.	Mapping Unit No.	PLWR/BASA Vegetation Series	Perennial Water Permanence	Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration.	Stand canopy 11-25%. interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand. ✓	Tree canopy 5-10%. 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking. very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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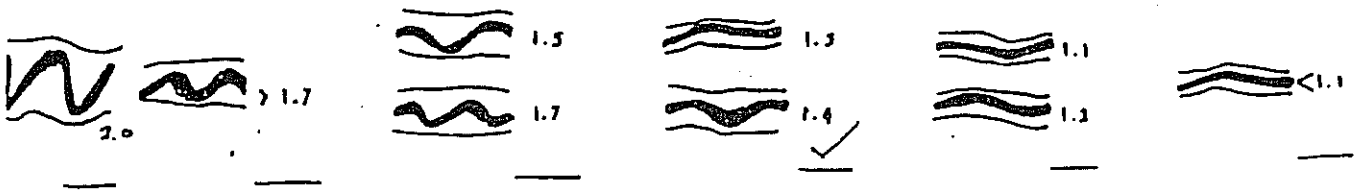
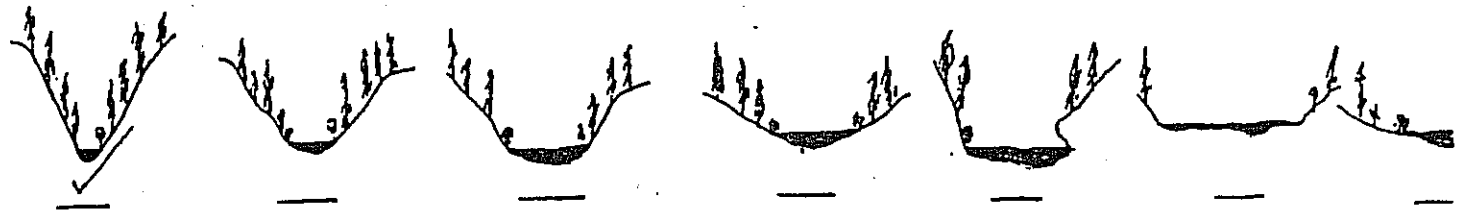
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes. rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks. ✓	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare.	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement during
	4	3	6		

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

13 (Total Riparian (Annual high water width)) + 2 (Aquatic width) = 15 (Riparian width (feet))

Probable Damaging Agents:

None _____. 100-year Flood ✓. Adjacent or Upstream Development _____. Burning _____. Big Game Browsing and Concentration _____. Livestock Grazing ✓. Tree or Shrub Removal _____. Sedimentation _____. Channelization _____. Gravel Dredging _____. Wild Fire _____. Roads _____. People Trampling _____. Concentrated and Untreated Effluents _____. Excessive Dewatering _____. Other TERRACES show signs of heavy cattle use. BERMUDA GRAZED TO NUBS — no seedheads PRESENT. DISTURBANCE PLANT GUTIERREZIA SAROTHRAE PRESENT, ALSO EROSION AND SLUMPING of BERRACES VISIBLE. TERRACE DEVELOPMENT LIMITED IN THIS NARROW CANYON. LARGE LOGS STRANDED ON BOULDERS AWAY FROM CHANNEL INDICATES MASSIVE FLOWS DO OCCUR (1983)

Woody Overstory Species (list in order of abundance): PLATANUS WRIGHTII, ALNUS OBLONGIFOLIA

Remarks and Recommendations: BEDROCK PROMINENT IN CHANNEL. MOST of damage (EXPOSED ROOTS, SPARSE TREE CANOPY) RELATED TO SCOURING IN RESTRICTED CHANNEL. THIS REACH OF STREAM CHARACTERIZED BY DISCONTINUOUS but DENSE THICKETS of BACCHARIS SALICIFOLIA AND ISOLATED SCATTERED SYCAMORES >75 cm in DIAMETER. TREE UNDERSTORY DOMINATED BY

Riparian Area Scorecard

Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest | Elevation | Sardine Ck Reach | Reach 5 (DmP002) Valley Form | 14 Numeric & Ecological Rating

Clifton Ranger District | San Francisco R. Drainage | Legal Location | Water Regime | 28 June 1988 Date

Quad No. | Mapping Unit No. | A1OR/PLWR Vegetation Series | Perennial Water Permanence | Valenciano Examiner

	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers. light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
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4 6 4

Riparian Area Inventory

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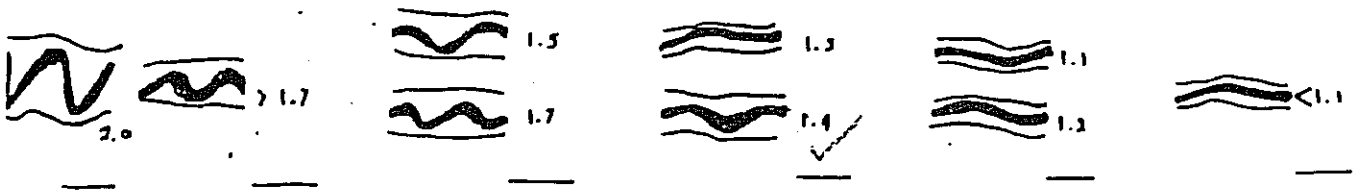
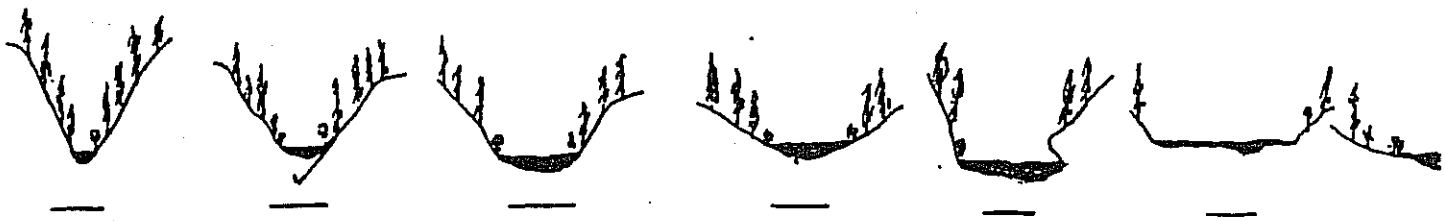


Cross Section:



Gradient:

<3.0% _____ 3.1-6.0% ✓ 6.1-10.0% _____ >10.0% _____

Area Data:

23 (Total Riparian) + 2 (Aquatic width) = 25 (Riparian width (feet))
(Annual high water width)

Probable Damaging Agents:

None _____, 100-year Flood ✓, Adjacent or Upstream Development _____, Burning ✓, Big Game Browsing and Concentration _____, Livestock Grazing ✓, Tree or Shrub Removal _____, Sedimentation _____, Channelization _____, Gravel Dredging _____, Wild Fire _____, Roads _____, People Trampling _____, Concentrated and Untreated Effluents _____, Excessive Dewatering _____, Other CATTLE TRAFFIC EVIDENT ON TERRACE. LACK OF WELL DEVELOPED SHRUB MIDSTORY. GRASSES SPARSE, TRAILING VISIBLE

Woody Overstory Species (list in order of abundance): ALNUS OBLONGIFOLIA, PLATANUS WRIGHTII

Remarks and Recommendations: EVEN AGED, DENSE STANDS OF ALDERS IN CHANNEL PROBABLY HAVE GROWN SINCE 1983 FLOOD.

Riparian Area Scorecard

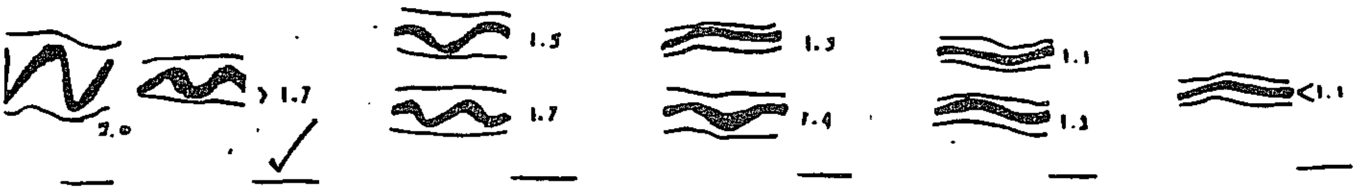
Deciduous Forest (Cold Temperate Forest)

Apache-Sitgreaves Forest	Elevation	Coal Ck Reach	Reach 2 (WCL 1) Valley Form	14 Numeric & Ecological Rating
Clifton Ranger District	San Fran. R. Drainage	Legal Location	Water Region	9 Feb 1988 Date
Quad No.	Mapping Unit No.	Sycamore/Ash Vegetation Series	Water Permanence	DEV Examiner

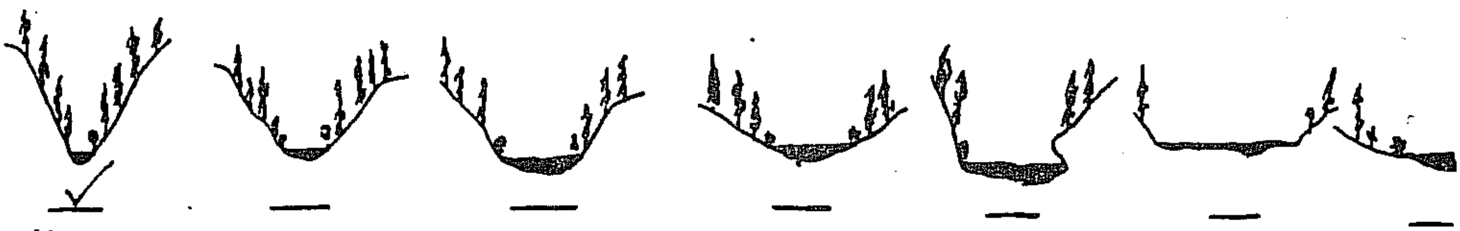
	4	3	2	1	0
A. Tree Overstory	Stands mostly discontinuous >40% canopy. 4 or more size classes. A species of deciduous trees dominant, occasional conifers, light use, regeneration linear and vigorous.	Stands discontinuous 25-40% canopy coverage 3 or 4 size classes. deciduous trees dominant, conifers infrequent, light to moderate use on regeneration. ✓	Stand canopy 11-25%, interspaces partially filled with shrubs or grasses, 2-3 size classes of trees present, exotics and and B species a minor component, moderate use or damage, regeneration just adequate to replenish stand.	Tree canopy 5-10%, 1 or 2 size classes with only decadent stands common, heavy use, seedlings and sprouts sparse and heavily damaged, new stands not establishing, exotics invading.	Canopy <5%, trees very scattered or entirely lacking, very heavy use and damage, no regeneration of native trees, exotics or C species often dominate.
B. Shrub Midstory	Shrub canopy >50%, 2 or more A shrub species present, but a single genus such as Salix may dominate, growth form linear, light browsing on most A species.	35-50% shrub canopy, variety of species but single A species dominance more common, growth form mainly linear but some lateral branching from light browsing. ✓	Canopy coverage 21-35%, some B species which can dominate stands, lateral branching common from moderate use, regeneration limited.	Canopy coverage 10-20%, single age classes and single species commonly dominate, browsing heavy causing clubbed appearance, little to no reproduction of desirable species.	Canopy <10%, only C species present in sizeable numbers, or shrubs lacking, remnant C species severly clubbed, no regeneration.
C. Understory	A species dominate, forbs limited to those which are highly palatable, >90% ground cover, plants vigorous with large seed heads, desirable seedlings filling bare spaces, or occupied by litter, light use >5%.	Some B species, up to 25% in composition but dominated by desirables, perennial forbs a component of the understory, ground cover 80-89% seed heads common, trampling minimal, light to moderate use.	B species common, few C species, 65-79% ground cover, vigor down, some seed heads on C species, soil compaction evident, use moderate to heavy. ✓	B species dominant with a few remnant weakened relic A species, invader plants common, 50-64% ground cover, vigor down due to heavy current use, soil movement evident.	B & C species dominant, <50% ground cover, bare spaces increasing, very heavy current use, overland erosion & soil compaction widespread.
D. Stream Bottom	Assortment of particle sizes. Large rocks and boulders dominate. Bedrock outcrops may be common. Most rocks angular. Logs & rocks firmly embedded. ✓	Most sized particles present, rocks angular to subangular. Most rocks and logs firmly embedded. Bedrock outcrops uncommon. Little scouring or deposition.	Few particle sizes, rocks subangular, some rounded, but most rocks embedded and stable. Some scouring evident. Gravel bars uncommon, but those present are large.	Large rocks dominate, most rocks rounded. Large logs with root systems easily moved by flood flows. Few rocks and logs firmly embedded. Large gravel bars common.	Even very large boulders rounded from moving and abrasion. Few stable obstructions during flood flows. Heavy scouring and deposition evident. Streambed broad, shallow in most places.
E. Streambank Stability	>65% bank rock content. Large areas of bedrock may be present. Little or no streambank damage. Plants of high vigor w... deep binding root systems. No channel enlargement or flooding outside banks.	40-65% bank rock content. Little or no bedrock visible. Infrequent bank damage, mostly at curves and restrictions. Infrequent exposed tree/shrub roots. Undercut banks stable, do not slump and erode. Minimal sediment production from banks.	Significant mass wasting at specific points. Exposed tree/shrub roots common. Occasional tree undercut & fallen. Channel overflows infrequent. Occasional split channel. Occasional woody debris jams lodged in trees/shrubs by flood flows. Stable undercut banks rare. ✓	Mass bank wasting common but not continuous. Undercut & fallen trees common. Many exposed tree/shrub roots. Woody debris jams in trees or shrubs common. Few if any stable undercut banks. Split channels common. Flooding outside of banks common.	Stream channel poorly defined. Streambed broad, shallow, with few irregularities. Heavy annual flood flows destroy most vegetation in floodplain each year. Very few large trees in floodplain. Few objects in floodplain that resist movement dur...
	4	6	4		

Riparian Area Inventory

Stream Meander (Sinuosity):



Cross Section:



Gradient:

<3.0% ______ 3.1-6.0% ______ 6.1-10.0% ✓ >10.0% ______

Area Data:

6 m + 5 m = 11 meters

Total Riparian (Annual high water width) + Aquatic width = Riparian width (feet)

Probable Damaging Agents:

None ______, 100-year Flood ✓, Adjacent or Upstream Development ______, Burning ______, Big Game Browsing and Concentration ______, Livestock Grazing ✓, Tree or Shrub Removal ______, Sedimentation ______, Channelization ______, Gravel Dredging ______, Wild Fire ______, Roads ______, People Trampling ______, Concentrated and Untreated Effluents ______, Excessive Dewatering ______, Other In restricted canyon major portion of damage is due to flooding. Grazing damage is light and area is rough with large boulders dominating both lower and upper terraces

Woody Overstory Species (list in order of abundance): Platanus wrightii, Fraxinus pennsylvanica, Populus fremontii, Salix gooddingii

Remarks and Recommendations: Site most likely to have perennial flow
[…]an any other stretch within lower 2 miles. This site with willows not
[…]lly representative of ephemeral stretch we hiked up. Serious mass wasting
[…]ng here in steep walled canyon. lycamores on terrace side of stream
[…]rowing 3-4 m above channel. This site may in fact not represent
[…] perennial stretch but with presence of willows is probably at deepest